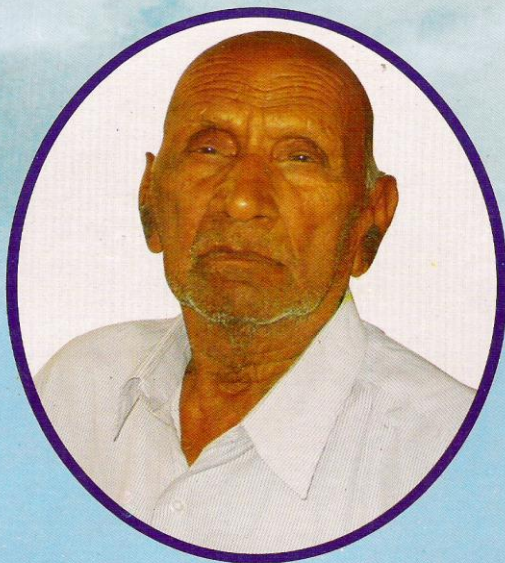


ANDROPAUSE



A MEDICAL ENIGMA RELATED TO MEN

Ved Parkash Bansal

Glimpses of an andropause face, Shri H.C. Aggarwal who was a known andropause because of the deficiency of testosterone.

He was a patient of coronary artery disease whose all 3 coronary vessels were blocked. He was a refused surgery for coronary vessels. He was put on testosterone for nearly 4 yrs before his demise.

He was fully active, going for morning walks and living independently for nearly 4 years of the testosterone treatment.

ANDROPAUSE



A Medical Enigma Related To Men

Ved Parkash Bansal

The secret to staying young is to live honestly, eat slowly, and lie
about your age."
Lucille Ball

"The trick is growing up without growing old."
Casey Stengel

"There are 3 stages to a man's life: youth, middle-age and 'You
haven't changed a bit!'"
Anonymous

Dedicated

*To my Parents for gifting me with the wealth
of genes*

&

*To my Wife for providing the environment for
these genes to flourish.*

Acknowledgement

Acknowledgements in a true sense is an occasion for the author to unload his debt to those who have helped him for writing this book at various stages namely conceptualizing the idea, drafting, writing, typing, editing, formatting, designing particularly so on a theme for which the author did not have the first hand technical experience. In modern era, on hand it is easy to search the literature on any subject but on the other had it is difficult to write it on the computer particularly when the author himself being handicapped to learn the nitty-gritty of computers due to Andropause.

All the above armentarians were required to bring the book to light. All this has been done by one and only one who deserves to be mentioned in bold letters, namely Dr Jitendra Sharma, my right-hand, the Lecturer at DAV Institute of Physiotherapy & Rehabilitation, Jalandhar, Punjab (INDIA). His brilliant English language, extraordinary knowledge of medicine (though he is a Physiotherapist), masterly skills in handling the naughty and clever computer had really been responsible to complete the book in a short period of three months. Jitendra had been sitting on the computer at odd hours, even on holidays, that too when he himself was not keeping good health during the major part of these three months and for the rest of the period, his six months old son Daksh was sick. More than Jitendra, my sincere thanks are due to his wife Kavita who along with Daksh awaited Jitendra on many days late at night. Jitendra has drafted many paragraphs in this book and particularly the chapter on Fall-Outs.

But for Jitendra, it would have been extremely difficult for me to complete this book in such a short time. For writing this book, acknowledgement is a small word for Jitendra, I am rather indebted to him for all the help he has given me at different stages.

My thanks are due to Mr. Ashok Mittal, my son-in-law, and his father Mr. Omi Mittal for editing the book, suggesting the title and for helping me in registering the domain for my website.

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Special thanks are in order for Dr Manvir Gupta from Kotkapura (Punjab) for providing the clinical history and management profiles of his patients that have been included in Chapter XVI.

My Personal Assistant at DAV Institute of Physiotherapy & Rehabilitation, Mr Satish Beri needs special mention for typing parts of the manuscript as and when required.

Dr Gopesh N Sharma, Lecturer at Dayanand Ayurvedic College, Jalandhar needs a special mention for his expert contribution on the use of various herbs as treatment of Andropause.

During the period while I was working on this book, my younger son Saraansh had been in the final preparations of high school examinations that were due in March and he needed me the most. But for the support of my wife, Kajala, so as to spare me from the household responsibilities, it would not have been an easy task to complete this book. I am also thankful to her for critical analysis and editing the book at different stages.

PREFACE

It is not every day that somebody thinks about writing a book. One needs very strong stimulation to do so. The thought of writing a book and that too on a topic that does not relate directly to my speciality and experience did not come until and unless I myself experienced the effects of Andropause and became aware of its ramification for the society as a whole.

It is natural for one who is born to die and the one who is born will also have to become old. There is no escape. However, it is not necessary to feel old. The surges of vigour and vitality that he experiences during growing years, that also mark the transition between stages of life, are all consequences of swelling Testosterone levels. Similarly, its decrease also informs us of stepping into the phase of mature adulthood.

In the first instance, it was first my wife who after having attended a Seminar made me aware of the possibility that my problems and sufferings could be related to Andropause. The subsequent tests, interaction with other specialists and review of literature on the topic has convinced me that this issue needs to be addressed at a public level. I happened to interact with a senior physician who had recently attended a session during the conference of Indian Association of Physicians. He had not been aware of Andropause or its related features prior to this conference. When asked to comment on Andropause, he concurred with me entirely and summed up the current scenario as being 'an epidemic'. What is even more disturbing is that only recently have we been alerted to this epidemic thanks to the researches and development of new diagnostic tests. I do not say that this is a new disease, rather this is a new discovery. It will be entirely inappropriate, to the extent of being criminal, for the physicians and policy makers to disregard Andropause as a normal ageing phenomenon. At the same time the onus is on the individual also, after all it is our health that matters – to us as well as the nation.

The motive behind this book is very simple. I would like my fellow males to be aware of Andropause and its various presentations and also to generate a sympathetic attitude amongst my fellow professionals relating to patients suffering with Andropause. I am certain that with the help of advances in modern medicine, we can have a vibrant ageing. Neither I am saying that we can stop aging nor am I postulating that stopping Andropause will drive away death. If Andropause is recognised at proper stage and treated in a proper manner, the man in his last 2-3 decades of life can feel younger and healthier. I see nothing wrong in being as young as 40 in sixties.

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CHAPTER I

INTRODUCTION

"Growing old is no more than a bad habit which a busy person has no time to form."

Andre Maurois

Male Menopause is technically referred to as Androgen Deficiency Amongst Men (ADAM). The other names that have been used to describe it are Male Climacteric and Veropause. Most professionals use the term Andropause in reference to Male Menopause and it is this term that has been preferred in this book. In females the term menopause denotes the end of reproductive life and almost complete cessation of functioning of the female gonads and the production of female hormone oestrogen. Similarly, Andropause denotes the cessation of male gonad functioning and stoppage of Testosterone (The Male Hormone) production. The onset of Andropause is not as clear as menopause in females. It is believed that the process leading to Andropause starts anywhere between the ages of 40 to 55 years¹ wherein the incidence is between 2 to 5 %. Beyond this age, incidence rises to between 6 to 30 % (50-59 years), 20 to 45 % (60 – 69 years) and 34 to 70 % (70-79 years). *The incidence in men who are over 80 is estimated at 91 %.*² As you can see, the "spread" of incidence is fairly large. This is due to the fact that different specialists use different ways to measure androgens and use different minimum levels to define Andropause. Almost all men are

affected. The degree and nature of affection varies (Table 1).

**TABLE 1: SYMPTOMS ASSOCIATED WITH
"ANDROAPUSE"**

General: <ol style="list-style-type: none"> 1. Skin Thinning 2. Sleep Disturbances 3. Slower Injury and Illness Recovery 4. Reading Difficulty (small print) 5. Reduce Interest in Sex 6. Thinning or Loss of Hair 7. Weight Gain 8. Prostate Enlargement / Cancer 	Brain and Psychology: <ol style="list-style-type: none"> 1. Anxiety and Fear - About Losing Sexual Potency 2. Depression 3. Forgetfulness and Difficult Concentration 4. Indecisiveness 5. Irritability 6. Loss of Purpose and Direction in Life 7. Loss of Self-Confidence 8. Poor Concentration / Memory Lapses 9. Short Term Memory Loss 10. Stroke/Paralysis
Sexual: <ol style="list-style-type: none"> 1. Libido Reduction 2. Erectile Dysfunction 	Heart and Blood Vessels: <ol style="list-style-type: none"> 1. High blood pressure 2. Atherosclerosis 3. Coronary Artery Disease
Bones and Muscles: <ol style="list-style-type: none"> 1. Muscle Weakness 2. Muscle Soreness and Stiffness 3. Osteoporosis / Bone Mass Decrease 4. Fatigue (Less Endurance for Physical Activity) 	

The biological changes that happen to man in this age group is directly related to the Testosterone (particularly free Testosterone) levels. A thorough understanding of male hormones like Testosterone, their physiological functions and their age-wise biological levels will help a great deal in combating

Andropause and averting the “Midlife Crisis” that all men have to face.¹

Testosterone is the male hormone that is responsible for the development of a male child in the embryo at six weeks and since then controls further development of the embryo to a full grown male child at birth. Testosterone continues to exert its effect on the growth of the newly born male child to a boy. During this growth period, Testosterone plays its role in identifying them as boys as against girls. All this is an effect of Testosterone.

At puberty under the effect of this very Testosterone, the sexual organs gain their youthful structure. The penis takes its real size and shape and at the same time the secondary sexual characters like the pubic hair, the hair in axilla, the beard, hair on the chest and the rest of the body come up. The growth of the hair of course is within the hereditary limits. At this stage vocal cords get enlarged and the voice changes. The thickness of the skin of men and increase in the secretion of the sweat glands at this age are all under the influence of Testosterone. At this age, the Testosterone is at its maximum level in the body which effects upon the development of the bones, the muscles, the stamina so much so that the Testosterone reflects upon the behaviour and the attitude of the person.

From puberty till the age of about thirty years the Testosterone continues to remain at its highest level when the man is in its highest form in the best of his qualities and proud of his manhood. The hood of man is fully indebted to Testosterone. Testosterone level from the age of about 30 years starts showing its decline and the rate of decline is variable depending

upon many other factors like genetic, environmental, diet, exercise, nature, aspirations, ambitions, stress and a host of many other factors that may be beyond the scope of this book.

Depending upon the above factors and many others that are not under our control the man starts feeling his manhood getting out of hands, which we Indians pass off as the wish of God Almighty. This is the stage when the level of Testosterone in blood reduces to an extent to make him limp towards ageing which makes him prone to grave diseases particularly of the heart and brain.

The purpose of writing this book is to make my *homo sapien* brothers to become aware of this ageing process and to suggest effective preventive steps to control the factors that cause ageing, to delay ageing and regain his manhood. If Andropause is identified in early stages, it can be treated thereby making life healthy, comfortable, enjoyable and longer. It may be a fiction today but it may be a reality tomorrow - if man does not get old at all or at least the hood of man keeps the manhood of the man for longer time.

"You're never too old to become younger."

Mae West

CHAPTER II

MY STORY

You can't help getting older, but you don't have to remain so if you desire.

As I write this book, I am 63 years young. Hailing from a small rural town in Punjab (India), life has taken me to various metropolises in India and abroad. Till a couple of years back I used to think that I had seen it all – the ups and downs, the big and small, the happy and sad – almost everything till things started to change for me in an unprecedented manner. Before I share with you as to what happened to me so differently, I would like to relay my past to you to enable you in having a better perspective of my predicament.

I am the eldest of seven siblings. Being from a rural background, we had two buffaloes in our backyard that endowed us with abundant of milk and butter. Besides, we had good quantities of carbohydrates and proteins – a healthy and nutritious diet. Right from my childhood, I had excelled in studies. I must admit that my indulgence in games was not as remarkable, primarily because only kabaddi and hockey were known then. In order to burn out the high calories I ingested, I used to go for morning walks of 5-6 kilometers everyday, a habit that I still perform religiously. I do not argue whether it was the morning walks of simply the good genetic framework inherited from my parents, but somehow I always maintained a good physical shape till the age of 60 years. When I did notice that I was building adipose stores, I undertook a two-month weight reduction programme of Herbal-Life. I take it as a matter of personal pride that I did not have any illnesses in my initial 60 years of life, not even headaches till 50 years of age. My medical history is rather low profile – single episode of malaria

(at 40 years), couple of bouts of sore throat (between 50-60 years), vasectomy (optional, at the age of 48 years) and prostatectomy (optional, at the age of 62 years). I recently started having hypertension after the age of 62 years (after prostatectomy, as all my investigations before the surgery were all normal).

On the mental front I have been a leading and pro-active professional, academician and administrator throughout my career. My peers, colleagues and subordinates shall vouch for my mental acuity and administrative prowess. Rarely was there such an occasion that flustered my calm and composure. I must say that I was on top of life for 60 years.

My problems started building up gradually and quietly after the age of 60 years. I started forgetting things, became irritable, became hypertensive but most obviously I started to have frequent joint pains with associated muscle wasting around the thighs and calves. My peripheral vision also deteriorated, especially at night, so much that my wife used to point out that I would hit things on the roadside or some sidecar. I felt colder than usual.

I consulted many a physicians and consultants and undertook all sorts of investigations to diagnose my problem. However, ambiguity and indecisiveness persisted for about one and a half years. Nobody even hinted that my symptoms could be related to hormonal deficiency and yet most of them were brazen about telling me that it was all related to ageing. I started to give in to fate and destiny before one fine day when my wife, who is a Gynaecologist, gave me the best birthday gift at 63 years.

She had attended a seminar on 'Sexology'. That very evening she told me that several of my symptoms were similar to those described during the seminar. She suggested that I should undergo investigations to rule out Andropause. My hopes rose when the investigations confirmed my wife's doubts. I was having ANDROPAUSE, positively.

I started taking oral testosterone 160 mg. per day for one week followed by 80mg. testosterone per day and with this now for the last three month I am feeling much better. The pain in my lower limbs is reduced, almost negligible. I am able to do my

exercises and go for nearly normal diet. My blood pressure has gone down slightly though still it is on higher side. The sleep is comfortable though still disturbed. I am back to my office duties and devoting good time on different issues. For the time being, the testosterone have proved useful to me. I do not have any pain in the knee-joints. I felt warm during last winter though the weather in this Northern part of India is very cold.

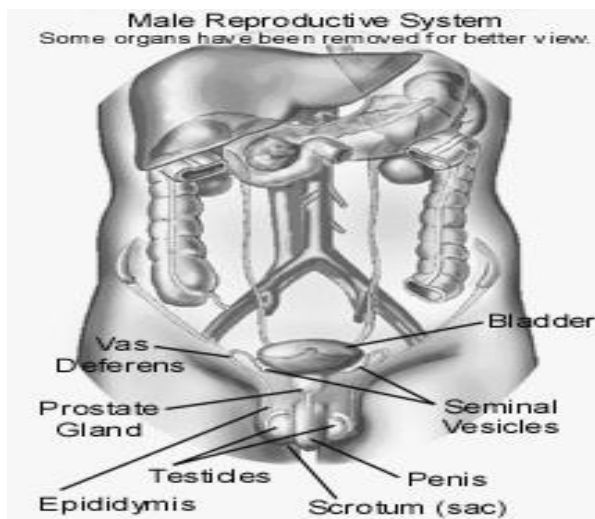
CHAPTER III

MALE REPRODUCTIVE SYSTEM

All living things, including humans, reproduce; it's one of the things that set us apart from nonliving matter. And because all living things eventually die, new creatures of the same kind must constantly be born to perpetuate a particular species. Interestingly, although the reproductive system is essential in keeping a species alive, unlike other body systems, it is not essential in keeping an individual alive.¹

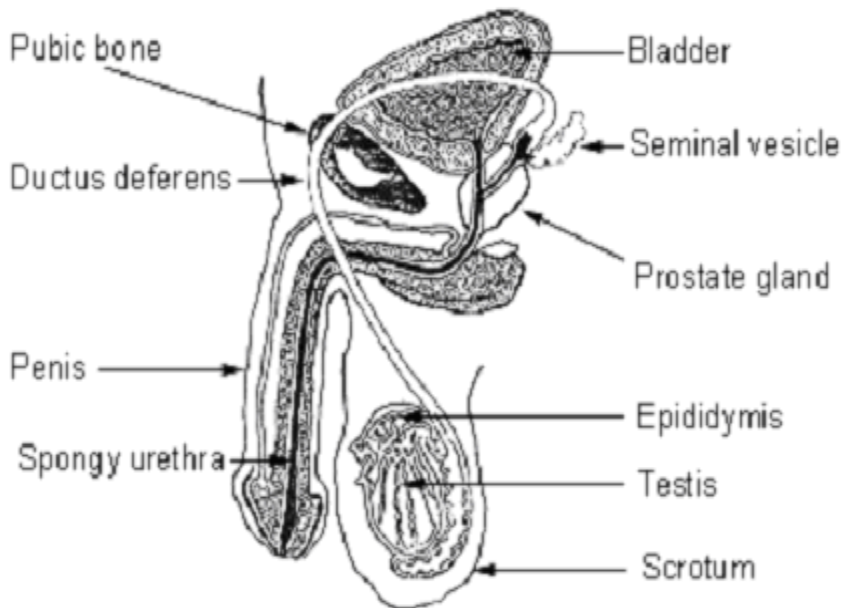
In the reproductive process, two kinds of sex cells, or gametes, are involved. The male gamete, or sperm, and the female gamete, the egg or ovum, meet in the female's reproductive system to create a new individual.

Fig 1: Location of the male reproductive system.



The male reproductive system consists of a pair of testes and a network of excretory ducts (epididymis, vas deferens, and ejaculatory ducts), seminal vesicles, the prostate, the bulbourethral glands, and the penis.ⁱⁱ

Fig 2: Sagittal section of a male reproductive system



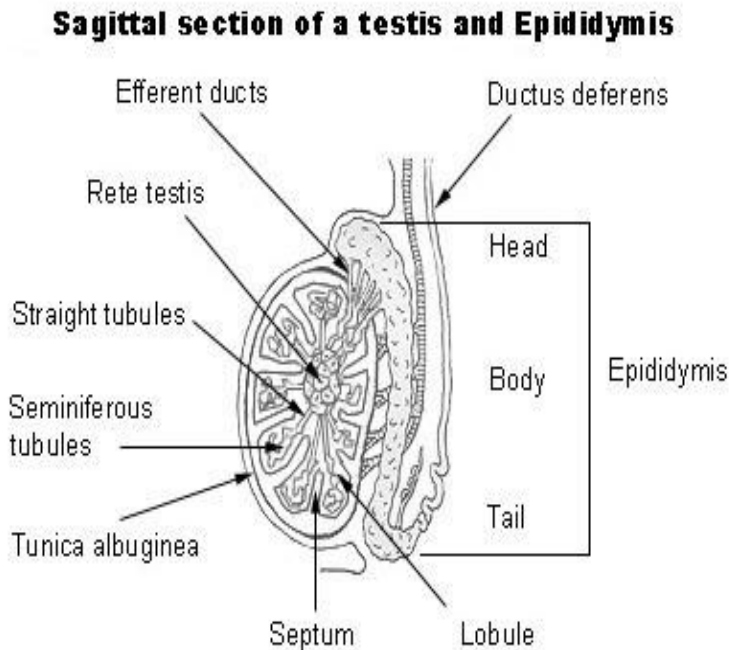
Structure of testes and production of sperms

Each testis is an oval structure about 5 cm long and 3 cm in diameter. A tough, white fibrous connective tissue capsule, the tunica albuginea, surrounds each testis and extends inward to form septa that partition the organ into lobules. There are about 250 lobules in each testis. Each lobule contains 1 to 4 highly coiled seminiferous tubules that converge to form a single straight tubule, which leads into the rete testis. Short efferent ducts exit the testes. Interstitial cells (cells of Leydig), which produce male sex

hormones, are located between the seminiferous tubules within a lobule (Fig 3).

Sperm are produced by spermatogenesis within the seminiferous tubules. Sperm production begins at puberty and continues throughout the life of a male. The entire spermatogenesis process takes about 74 days. A transverse section of a seminiferous tubule shows that it is packed with cells in various stages of development. Interspersed with these cells, there are large cells that extend from the periphery of the tubule to the lumen. These large cells are the sustentacular cells (Sertoli's cells), which support and nourish the other cells.

Fig 3: Sagittal section of testis and epididymis



Epididymis

Sperm leave the testes through a series of efferent ducts that enter the epididymis. Each epididymis is a long (about 6 meters) tube that is tightly coiled to form a comma-shaped organ located along the superior and posterior margins of the testes. When the sperm leave the testes, they are immature and incapable of

fertilizing ova. They complete their maturation process and become fertile as they move through the epididymis. Mature sperm are stored in the lower portion, or tail, of the epididymis.

Ductus Deferens

The ductus deferens, also called vas deferens, is a fibromuscular tube that is continuous (or contiguous) with the epididymis. It begins at the bottom (tail) of the epididymis then turns sharply upward along the posterior margin of the testes. The ductus deferens enters the abdominopelvic cavity through the inguinal canal and passes along the lateral pelvic wall. It crosses over the ureter and posterior portion of the urinary bladder, and then descends along the posterior wall of the bladder toward the prostate gland. Just before it reaches the prostate gland, each ductus deferens enlarges to form an ampulla. Sperm are stored in the proximal portion of the ductus deferens, near the epididymis, and peristaltic movements propel the sperm through the tube.

Ejaculatory Duct

Each ductus deferens, at the ampulla, joins the duct from the adjacent seminal vesicle (one of the accessory glands) to form a short ejaculatory duct. Each ejaculatory duct passes through the prostate gland and empties into the urethra.

Urethra

The urethra extends from the urinary bladder to the external urethral orifice at the tip of the penis. It is a passageway for sperm and fluids from the reproductive system and urine from the urinary system. While reproductive fluids are passing through the urethra, sphincters contract tightly to keep urine from entering the urethra. The male urethra is divided into three regions. The prostatic urethra is the proximal portion that passes through the prostate gland. It receives the ejaculatory duct, which contains sperm and secretions from the seminal vesicles, and numerous ducts from the prostate glands. The next portion, the membranous urethra, is a short region

that passes through the pelvic floor. The longest portion is the penile urethra (also called spongy urethra or cavernous urethra), which extends the length of the penis and opens to the outside at the external urethral orifice. The ducts from the bulbourethral glands open into the penile urethra.

Penis

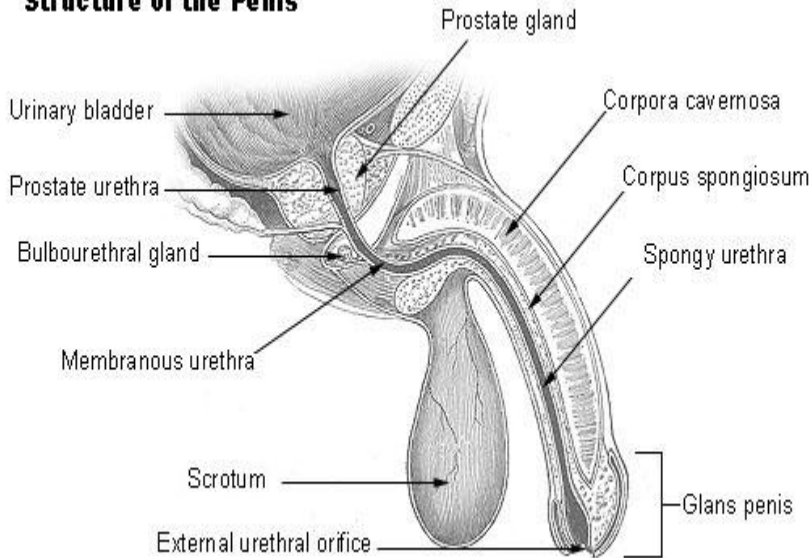
The penis, the male copulatory organ, is a cylindrical pendant organ located anterior to the scrotum and functions to transfer sperm to the vagina. The penis consists of three columns of erectile tissue that are wrapped in connective tissue and covered with skin (Fig 4). The two dorsal columns are the corpora cavernosa. The single, midline ventral column surrounds the urethra and is called the corpus spongiosum.

The penis has a root, body (shaft), and glans penis. The root of the penis attaches it to the pubic arch and the body is the visible, pendant portion. The corpus spongiosum expands at the distal end to form the glans penis. The urethra, which extends throughout the length of the corpus spongiosum, opens through the external urethral orifice at the tip of the glans penis. A loose fold of skin, called the prepuce, or foreskin, covers the glans penis.

The male sexual response includes erection and orgasm accompanied by ejaculation of semen. Orgasm is followed by a variable time period during which it is not possible to achieve another erection.

Fig 4: Structure of Penis

Structure of the Penis



Regulation of the Reproductive System

The male reproductive regulatory system consists of four components:

1. The central nervous system (CNS) including the hypothalamus
2. The pituitary gland
3. The testes; and
4. The end organs where testicular steroids act.

The master control starts in the hypothalamus where gonadotropin-releasing hormone (GnRH) is synthesized and is released in pulses into a vascular network that connects the hypothalamus to the pituitary gland. GnRH production and release is controlled by numerous neurotransmitters, including norepinephrine, dopamine, and endorphins. GnRH regulates the release of two pituitary hormones - the gonadotropins - luteinizing hormone (LH) and follicle-

stimulating hormone (FSH) in pulses. LH regulates the production and secretion of testosterone by the Leydig cells of the testes, and FSH stimulates production of sperms in the seminiferous tubules.

Testosterone circulates in the blood in several forms. It can be bound to both albumin and sex hormone-binding globulin (SHBG) where it is referred to as "bound testosterone" or else it can also circulate in a "free" (unbound) form. Starting at about age 30, testosterone levels drop by about 10 percent every decade. At the same time SHBG is increasing. SHBG traps much of the testosterone that is still circulating and makes it unavailable to exert its effects in the body's tissues. What's left over does the beneficial work and is known as "bioavailable" testosterone.ⁱⁱⁱ

Testosterone exerts its effect directly on the testosterone receptors in cells. It can also be converted to two active metabolites - dihydrotestosterone (DHT) through the enzyme 5 alpha reductase, or by the enzyme aromatase to estradiol.^{iv}

Normal Physiology

The male sex organs work together to produce semen and to release the sperms into the reproductive system of the female during sexual intercourse. They also produce and secrete sex hormones.^v

During puberty, sex hormones help a male to develop into a sexually mature man. At this time, usually between the ages of 9 and 14, the pituitary gland secretes hormones that stimulate the testicles to produce testosterone, which is responsible for bringing about a series of sexual changes. These changes may occur at different rates but generally follow a set sequence.

The first stage of sexual maturation involves the growth of the scrotum and testes. Next, the penis becomes longer, and the seminal vesicles and prostate gland grow. Hair begins to appear in the pubic area, and about 2 years later, it grows on the face and underarms. The voice deepens, and males may experience their first ejaculation. Most males will also undergo a growth spurt during adolescence, reaching their adult height and weight. The onset of

sexual maturation may be delayed or brought on earlier by certain genetic abnormalities or illnesses.

An adult male produces several million sperm cells every day. Sperm develop in the testicles within a system of tubes called seminiferous tubules. When a male baby is born, his tubules contain simple round cells, but during puberty testosterone and other hormones cause these cells to divide and change until they are thin, with a head and short tail, like tadpoles. The head contains genetic material (genes). The sperm use their tails to propel themselves into the epididymis, where they complete their development.

The sperm then move to the vas deferens, or sperm duct. The seminal vesicles and prostate gland produce a whitish fluid called seminal fluid, which mixes with sperm to form semen as a result of sexual stimulation. The penis, which usually hangs limp, becomes hard when a male is sexually excited. Tissues in the penis fill with blood and it becomes stiff and erect. When the erect penis is stimulated, muscles around the reproductive organs contract and force the semen through the duct system and urethra. Semen is expelled from the body through the urethra inside the penis. This process is called ejaculation. Each milliliter of semen contains about 100 million sperm.

The rigidity of the erect penis aids its insertion into the female's vagina during sexual intercourse. When the male ejaculates, semen is deposited into the female's vagina. The sperm make their way up to the uterus with help from uterine contractions. If a mature egg is in one of the fallopian tubes, a single sperm may penetrate it, and fertilization or conception occurs.

The cell is now a zygote, containing its full quota of 46 chromosomes, half from the egg, and half from the sperm. The cell divides again and again as it grows in the female's uterus. The genetic material from the male and female has combined to create a new individual.

ⁱ Lam M., Symptoms of Andropause in Andropause. URL:
http://www.LamMD.com/A3R_brief_in_doc_format/andropause2002.cfm.

ⁱⁱ Werener MA., What is Andropause in About Andropause URL:
<http://www.Andropausespecialist.com/aboutandrop.htm>

ⁱⁱⁱ The Nemours Foundation , Basic Anatomy in An Body Basics article: Male Reproductive System. URL:
http://www.kidshealth.org/parent/general/body_basics/male_reproductive_p2.html.
This information was provided by KidsHealth, one of the largest resources online for medically reviewed health information written for parents, kids, and teens. For more articles like this one, visit <www.KidsHealth.org> or www.TeensHealth.org. ©1995-2004.

^{iv} URL: <http://www.blc.arizona.edu/courses/181gh/rick/reproduction/male.html>

^v Organon NV. About Andropause in Andropause
URL:http://www.andropause.com/about_andropause/causes.asp

^{vi} Lam M, Symptoms of Andropause. URL:
http://www.LamMD.com/A3R_brief_in_doc_format/andropause2002.cfm.

^{vii} The Nemours Foundation , Basic Anatomy in An Body Basics article: Male Reproductive System. URL:
http://www.kidshealth.org/parent/general/body_basics/male_reproductive_p2.html.
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CHAPTER IV

TESTOSTERONE

Testosterone, one of the most important androgens, is synthesized from cholesterol and is chemically known as 17-beta-hydroxy-4-androstene-3-one. It was first isolated by a Dutch scientist in 1935 from mice testicles and successfully synthesized by the German biologist Adolf Butenandt.¹ Although it was the first hormone to be discovered, yet its overall role is still not completely defined.

Testosterone is primarily produced in the Leydig cells of Testes, which is why it is also referred to as He-Hormone. It is also produced in lower quantities in the adrenal glands that are situated atop the kidneys.

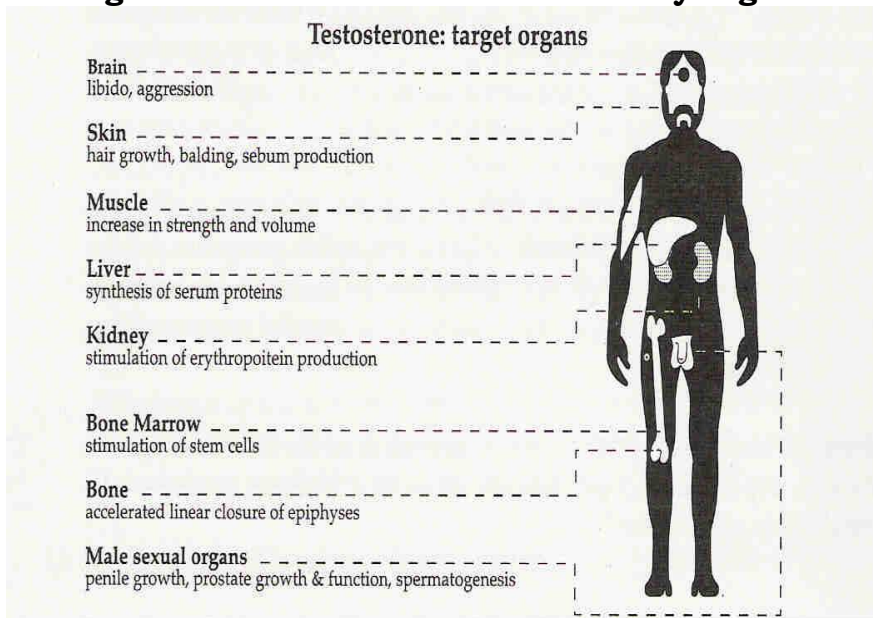
The regulation of testosterone in blood is a complex system, through an inter-relation between the small part of brain known as hypothalamus, another master gland present in the skull known as anterior pituitary gland and the testes. The regulation of testosterone levels happens through a feedback mechanism that restores the hormonal levels if due to any reason the level of testosterone decreases in the body. The hypothalamus secretes Gonadotropic Releasing Hormones (GnRH) which further controls the Luteinising hormones (LH) having a direct effect on the production of testosterone by the Leydig cells in the testes. Another hormone secreted by the anterior pituitary gland is Follicle Stimulating Hormone (FSH) that has got direct effect on spermatogenesis. Both testosterone and FSH act synergistically on some of the testicular cells to stimulate the secretion of **Androgen-Binding Protein (ABP)**. This protein binds to testosterone and keeps the concentration of testosterone high near

the area in the testis where the sperms are produced. Testosterone is liquid soluble which diffuses out of the different cells/tissues of the testes into the blood. The testosterone that is secreted by the Leydig cells of the testes also affected by some target cells in the prostate gland where due to an enzyme called *5 alpha –reductase* converts testosterone to even more potent androgen called **Dihydro Testosterone (DHT)**.

Therefore there are two types of androgens available in the body, one is testosterone and the other is DHT. Both these androgens bind to the same receptors, which are found within the nuclei of target cells. The hormone- receptor complex acts to regulate gene transcription, turning on transcription of some genes and turning off transcription of other genes. As a result of these changes in gene activity, following are some of the effects amongst many on the male body²:-

1. Testosterone plays a crucial role in the development of the male excretory ducts and the descent of testes in the embryo. Formation of the external genitalia, on the other hand, is influenced by DHT. Testosterone also plays a role in the development of certain regions that typifies a male brain.
2. The development and enlargement of male sex organs and the development of masculine secondary sexual characteristics that are seen during puberty are due to Testosterone and DHT. These include physical changes like wide shoulders and narrow hips; pubic, axillary, facial, and chest hair; thickening of the skin; increased sebaceous (oil) gland secretion; and enlargement of the larynx thereby deepening of the voice.
3. Androgens promote sexual behavior including libido in both males and females and spermatogenesis in males.
4. Androgens stimulate protein synthesis. This obviously brings about heavier muscle and bone mass of most men as compared to women.

Fig 5 : Effect of testosterone on body organs



Importance of Testosterone³

Testosterone is a hormone that has a unique effect on a man's total body. Testosterone is produced in the testes and in the adrenal glands. It is to males what estrogen is to females.

Testosterone helps to build protein and is essential for normal sexual behavior and producing erections. It also affects many metabolic activities such as production of blood cells in the bone marrow, bone formation, lipid metabolism, carbohydrate metabolism, liver function and prostate gland growth.

Testosterone and the females

So far it has shown as if testosterone is a He-hormone. This is not true. Testosterone is also present in the blood of females. The central biological difference between adult men and women, then, is not that men have testosterone and women don't.

It's that men produce much, much more of it than women do. An average woman has 40 to 60 nanograms of testosterone in a deciliter of blood plasma. An average man has 300 to 1,000 nanograms per deciliter.¹

The real She-hormone in female is 'estrogen' which is more concerned with the reproduction organ in the female, the bearing of the same but whatever role it plays in relation to the different organs in the body is by the testosterone in males, nearly the same factor, the testosterone have in female.

At the time of conception even the embryo is a female and until and unless this is altered by the testosterone, the embryo shall develop into a female child.¹ Therefore, in embryo it is the testosterone that make the real boy in its form to make the masculine body and brain. In men, there is flood of testosterone twice first at six weeks after conception and then at puberty. The burst of testosterone in embryo primes the brain and the body sensitizing the male features with its instinctual knowledge how to respond to the latter's flood of testosterone when the changes of puberty are brought in the boy. Without testosterone the human would revert to the formation of female. Anybody based on this scientific ground may believe in the statement that it is not women who are made out of men but it is men who are made out of women.

Besides its control on body and brain, the big T also co-relates with energy i.e. self-confidence & competitiveness having strength and sexual drive. Testosterones are elevated in response to short-term confrontational situations e.g. street-fights, high-level debates and also in response to highly charged sexual environment, pornographic websites. However, in long-term stress situation like war. Testosterone levels decrease. It is higher in working women than those housewives. There are many more studies on record that the all lawyers who are habitual to combat have

testosterone at higher level than other lawyers. Testosterone levels have also been studied amongst criminals who have high level of testosterone than the normal males of same age.

“Testosterone is life and life is testosterone.”

CHAPTER V

METABOLISM

To the general public, testosterone is synonymous to sexual activities and other features related to manhood. Few realise its importance in metabolism, which is even applicable to those in medical practice.

By virtue of its influence on gene transcription, the primary role of testosterone is in protein metabolism. However, it also regulates sugar metabolism and through this pathway it influences the fat metabolism as well.¹

Protein metabolism

The anabolic action of androgens upon the skeletal muscle is well known for many years that have promoted its misuse in not only body builders and wrestlers, but also other sportspersons.^{2, 3}

Some authors through experimental studies have proven the effects of androgens on the assimilation of amino acids like leucine into muscle proteins. Incorporation of uridine into ribonucleic acid of muscle has also been shown to increase under the influence of testosterone.

Sugar metabolism¹

The decrease of male hormone with age leads to chronic intolerance to glucose and thus, diabetes. Now, this is recognised as the leading cause of maturity-onset diabetes after the age of 40 years.

Already in 1947, the professor Giuseppe Pellegrini, director of the Institute of Pathology from the University of Pavia in Italy, described the influence of androgens on the sugar metabolism of 68 patients in an report entitled: " *L'azione antidiabetica degli ormonali sessuali maschili nel quadro della fisiopathologia del*

diabete". An intramuscular injection of 5 to 25 milligrams of testosterone propionate provokes a significant decrease of glycaemia within the two or three hours following the injection and its action lasts four or five hours. The reduction of glycaemia is about 1 gram per litre with diabetics and glucosuria is reduced. In normal man the glycaemia falls to inferior plasmatic levels and not more because the hormonal balance is normal.

The regulation power of testosterone on sugar metabolism acts for a long time: after an androgenic treatment the glycaemia of diabetics is reduced during a few days and rises afterwards to the initial levels.

Fat metabolism¹

Through the pathway of sugar metabolism testosterone influences the fat metabolism. When you have too much glucose in the blood, it can't be burned enough through the Krebs' cycle (the capacity of burning is limited) and you have an overproduction of acetyl-coenzyme A which is the initial compound for making cholesterol and lipids.

Because every man, some time or other, will have a lack of testosterone production after forty, the values for triglycerides and of cholesterol will increase in the blood with age.

CHAPTER VI

HEART, BLOOD AND BLOOD VESSELS

Generally you are as young as your heart and brain. This all is based on how good is circulation to these vital organs of the body.

Involvement of blood vessels¹

The arteries of the human body, as the age advances, are usually involved simultaneously by arteriosclerosis and atherosclerosis. In arteriosclerosis, there is replacement of the muscles fibres of the artery by collagen tissue that is inelastic. These muscular fibres of the arteries need Testosterone to maintain their activity. With the loss of Testosterone, the muscular fibres become weak and are replaced by fibrous tissue. The pathology of atherosclerosis is characterized by fat and cholesterol deposition in the arterial wall. This phenomenon is the consequence of cholesterol and lipid accumulation in the body through the impaired sugar and fat metabolism when Testosterone reduces/lacks in the body.

Therefore arteriosclerosis and atherosclerosis are two general involution phenomena increasing with the decrease of Testosterone secretion. It is probably the reason for the elevation of blood pressure with age. Alexanderson et al ^{2, 3} have shown the anti- atherosclerotic benefits of Testosterone.

Ischaemic Heart Disease

For the last nearly 50 years, most of the doctors including the Cardiologists are of the view that Testosterone is bad for the heart which is based on two reasons, one reason is that heart-attack in men under their 50s is five times more common than in women in most of the western countries. Though the women catch up soon after that age unless they are on Hormone Replacement Therapy (HRT). According to this line of reasoning, therefore, Testosterone is bad for the circulation and estrogen is good. The second reason that the Testosterone is bad for heart is because of the bad affects of the methylTestosterone orally and its use by athletes taking the wrong drug in wrong doses for the wrong reason and all this gives bad propaganda in the papers.⁴

Recent researches, however, beg to differ. Studies in Britain and America have shown higher incident rates of developing heart disease in individuals with low Testosterone (and sometimes high estrogen) levels.⁴

Georges Debled has quoted similar studies and showed a positive correlation between lower Testosterone levels and coronary heart diseases. However, he points out, elevated estradiol levels pose greater risk for developing CHD.¹

Table 2: Association of Testosterone levels with CHD

Hormone	<i>Plasma level</i>	Correlation with coronary heart disease.
Total Testosterone	Low	+
Free Testosterone	Low	+
DihydroTestosterone	Low	+
Estradiol	Elevated	+

That Testosterone has beneficial effect on the heart can be discerned from its vasodilatory effect on blood vessels thereby

increasing the much required blood supply and nutrition to the muscles of the heart.^{4, 5, 6} It has also been found that Testosterone can prevent the type of spasm of coronary arteries that causes angina.

It is a common knowledge that high cholesterol levels (with the exception of HDL-cholesterol) are disadvantageous for the heart as the risk of developing CHD is greater in such individuals and which is all the more evident from Georges Debled's work.¹

Table 3: Correlation of cholesterol levels and CHD

High level of	Correlation with coronary heart disease
Total cholesterol	+
LDL – Cholesterol	+
Triglycerides	+
HDL - Cholesterol	-

The mechanism of CHD in individuals with high cholesterol levels is atherosclerosis. As mentioned before, Testosterone has anti-atherogenic properties. This is by virtue of its influence on the fat metabolism whereby it causes reduction in cholesterol and body fat in general.⁷

Blood hypercoagulability

Every individual knows that if there is a cut/ injury to the body, bleeding is stopped through a mechanism in blood itself which causes it to clot. This is through a complex system and one of the components in this system is fibrin. If the blood coagulates early than the normal period, this is known as blood hypercoagulability.

In normal medical practice, Aspirin is prescribed by the doctors to make the blood less coagulable in heart patients. The main question about blood is not how it coagulates but keeping it fluid. However, the side effects of this drug includes haemorrhages.

The dissolution of the blood clot is under the influence of fibrinolytic agents. Such fibrinolytic agents of the blood are under the influence of Testosterone as reported in the Lancet of the 21 July 1962 by Fearnley et al.⁸ Therefore, the use of Testosterone in cases where the blood is hypercoagulable cannot be overstressed.

Anaemia

The number of red blood cells decreases by 10% in castrated men. This is similar in men with low Testosterone plasmatic levels. The ischaemic heart disease is of course aggravated by this phenomenon.

In the chapter of Testosterone, the erythropoietic function of the Testosterone in the kidneys has already been emphasised. Lack of testosterone therefore, can produce anaemia.

In 1981, Najean et al. reported in the American Journal of Medicine the improvement of anaemia in a serial of 137 patients when treated by male hormones. Anaemia recurs when the therapy is stopped and improves again with androgens.⁹ The family physician may think of low Testosterone as cause of unexplained anaemia in old age.

Varix, Hemorrhoids And Thrombosis

The veins and the arteries are constituted by muscle fibres. The strength and tone of these muscle fibres is maintained by Testosterone. Lack of Testosterone produces involution of the muscular tissue of the vessels. Such situation in veins and arteries can cause varix, haemorrhoids and even thrombosis that have their own complications subsequent to dislodgement of the thrombus to vital organs like brain.

Gangrene

Obstruction/ paucity of blood supply to the distal parts of the arms and legs can trigger off necrosis of these areas which we commonly know as gangrene. The multiple and favourable effects

that Testosterone has on blood vessels can prevent the onset of gangrene and the same has been beautifully demonstrated pictorially by Moeller in his book titled “Testosterone Treatment of Cardiovascular diseases”¹⁰

So, it won't be improper to infer that Testosterone helps in promoting good health in men although these benefits could be nullified by increased aggressiveness and/or smoking.

CHAPTER VII

MIND AND MATTER

“Age is a question of mind over matter. If you don't mind, it doesn't matter.”

- Satchel Paige

What men do and how they do things depends on an intricate relationship between testosterone, mind and matter. This cannot be better explained than Andrew Sullivan's excellent article, which was published 4 years ago. His observations are as true today as they were when he wrote the article, and would probably remain true till mankind exists on Earth (or beyond) until a revolution is brought into the chemical nature of testosterone more affectionate to women to favour them against their own estrogens.

Andrew Sullivan¹

“It has a slightly golden hue, suspended in an oily substance and injected in a needle about half as thick as a telephone wire. I have never been able to jab it suddenly in my hip muscle, as the doctor told me to. Instead, after swabbing a small patch of my rump down with rubbing alcohol, I push the needle in slowly until all three inches of it is submerged. Then I squeeze the liquid in carefully, as the muscle often spasms to absorb it. My skin sticks a little to the syringe as I pull it out, and then an odd mix of oil and blackish blood usually trickles down my hip.

I am so used to it now that the novelty has worn off. But every now and again the weirdness returns. The chemical I am putting in myself is synthetic testosterone: a substance that has

become such a metaphor for manhood that it is almost possible to forget that it has a physical reality. Twenty years ago, as it surged through my pubescent body, it deepened my voice, grew hair on my face and chest, strengthened my limbs, and made me a man. So what, I wonder, is it doing to me now?

There are few things more challenging to the question of what the difference between men and women really is than to see the difference injected into your hip. Men and women differ biologically mainly because men produce 10 to 20 times as much testosterone as most women do, and this chemical, no one seriously disputes, profoundly affects physique, behavior, mood and self-understanding. To be sure, because human beings are also deeply socialized, the impact of this difference is refracted through the prism of our own history and culture. But biology, it is all too easy to forget, is at the root of this process. As more people use testosterone medically, as more use testosterone-based steroids in sports and recreation and as more research explores the behavioral effects of this chemical, the clearer the power of that biology is. It affects every aspect of our society, from high divorce rates and adolescent male violence to the exploding cults of bodybuilding and professional wrestling. It helps explain, perhaps better than any other single factor, why inequalities between men and women remain so frustratingly resilient in public and private life. This summer, when an easy-to-apply testosterone gel hits the market, and when more people experience the power of this chemical in their own bodies, its social importance, once merely implicit, may get even harder to ignore.

My own encounter with testosterone came about for a simple medical reason. I am H.I.V.-positive, and two years ago, after a period of extreme fatigue and weight loss, I had my testosterone levels checked. It turned out that my body was producing far less testosterone than it should have been at my age. No one quite knows why, but this is common among men with long-term H.I.V. The usual treatment is regular injection of artificial

testosterone, which is when I experienced my first manhood supplement.

At that point I weighed around 165 pounds. I now weigh 185 pounds. My collar size went from a 15 to a 17 1/2 in a few months; my chest went from 40 to 44. My appetite in every sense of that word expanded beyond measure. Going from napping two hours a day, I now rarely sleep in the daytime and have enough energy for daily workouts and a hefty work schedule. I can squat more than 400 pounds. Depression, once a regular feature of my life, is now a distant memory. I feel better able to recover from life's curveballs, more persistent, more alive. These are the long-term effects. They are almost as striking as the short-term ones.

Because the testosterone is injected every two weeks, and it quickly leaves the bloodstream, I can actually feel its power on almost a daily basis. Within hours, and at most a day, I feel a deep surge of energy. It is less edgy than a double espresso, but just as powerful. My attention span shortens. In the two or three days after my shot, I find it harder to concentrate on writing and feel the need to exercise more. My wit is quicker, my mind faster, but my judgment is more impulsive. It is not unlike the kind of rush I get before talking in front of a large audience, or going on a first date, or getting on an airplane, but it suffuses me in a less abrupt and more consistent way. In a word, I feel braced. For what? It scarcely seems to matter.

And then after a few days, as the testosterone peaks and starts to decline, the feeling alters a little. I find myself less reserved than usual, and more garrulous. The same energy is there, but it seems less directed toward action than toward interaction, less toward pride than toward lust. The odd thing is that, however much experience I have with it, this lust peak still takes me unawares. It is not like feeling hungry, a feeling you recognize and satiate. It creeps up on you. It is only a few days later that I look back and realize that I spent hours of the recent past socializing in a bar or checking out every potential date who came vaguely over

my horizon. You realize more acutely than before that lust is a chemical. It comes; it goes. It waxes; it wanes. You are not helpless in front of it, but you are certainly not fully in control.

Then there's anger. I have always tended to bury or redirect my rage. I once thought this an inescapable part of my personality. It turns out I was wrong. Late last year, mere hours after a T shot, my dog ran off the leash to forage for a chicken bone left in my local park. The more I chased her, the more she ran. By the time I retrieved her, the bone had been consumed, and I gave her a sharp tap on her rear end. "Don't smack your dog!" yelled a burly guy a few yards away. What I found myself yelling back at him is not printable in this magazine, but I have never used that language in public before, let alone bellow it at the top of my voice. He shouted back, and within seconds I was actually close to hitting him. He backed down and slunk off. I strutted home, chest puffed up, contrite beagle dragged sheepishly behind me. It wasn't until half an hour later that I realized I had been a complete jerk and had nearly gotten into the first public brawl of my life. I vowed to inject my testosterone at night in the future.

That was an extreme example, but other, milder ones come to mind: losing my temper in a petty argument; innumerable traffic confrontations; even the occasional slightly too prickly column or e-mail flame-out. No doubt my previous awareness of the mythology of testosterone had subtly primed me for these feelings of irritation and impatience. But when I place them in the larger context of my new testosterone-associated energy, and of what we know about what testosterone tends to do to people, then it seems plausible enough to ascribe some of this increased edginess and self-confidence to that biweekly encounter with a syringe full of manhood."

Mental abilities

Testosterone affects verbal ability and mental focus. The female style of thinking has been described as "web thinking" and

the male style "step thinking". And it's mostly due to testosterone's effect on the brain.²

The physical effects of testosterone are well documented but the awareness of its profound effects on the psyche is limited. Since it is unethical to experiment with human embryos by altering hormonal balances, what we do know today of the testosterone impact on mind is based on research conducted on animals, personal experiences and/or surveys. There are subtle differences in individual interpretation of testosterone effects on mind however, majority agree upon the notion that testosterone endows the individual with energy, self-confidence, competitiveness, tenacity, strength and sexual drive. This is irrespective of caste, creed and even gender.

Yes, women are also affected by testosterone similar to men. The animal experiments have shown that the genetic make-up does not affect this effect. Newborn female rats, injected with testosterone, developed penises and indulged in aggressive sex like male rats. Animals with female dominance demonstrate high testosterone levels in females like hyenas and sea snipes. Typical "male" behaviour, in other words, corresponds to testosterone levels, whether exhibited by chromosomal males or females.

As discussed earlier both men and women produce testosterone and the physical differences arise due to the huge difference in production levels. I wish to extend this notion from beyond physical zone into the behavioural strata also. Women with higher testosterone levels have high sex drive and are usually the dominant partner during sex. This is as true for heterosexuals as for lesbians. Although libido is not entirely Testosterone endowed, individuals with low Testosterone levels exhibit lesser sexual arousal and activity. Around the age of 25 – 30 years, when the testosterone levels are highest, men are prone to promiscuity. The zest for satisfaction is not a physical one but a hormonal one. It is interesting to note that testosterone levels are higher in bachelors

than in married men that further substantiates the idea of sexual gratification not being superficial.

Women in business exhibit higher testosterone levels than general female population. They are confident and energetic to the extent that they even subdue the “supposedly” dominant male species. Men or women engaged in fiercely competitive professions like sportspersons or lawyers have a higher testosterone level than those in docile jobs like ministers and general merchants. Male and female inmates with higher testosterone levels have frequent altercations with the prison officials and are more likely to get into trouble.

It remains to be concluded whether it is environmentally induced attitude or attitude-induced environment, however one thing is sure that testosterone is the major player in determining our behavioural responses. We conceive that the age of 20- 30 years is crucial in shaping anyone’s future. How convenient it is that in this age group the testosterone level is at its peak. Is it a coincidence then that individuals in this age are more boisterous than other age groups?

It won’t be altogether incorrect to say that testosterone is a “Booster” hormone. It not only boosts the musculoskeletal system presenting with enhanced muscle bulk, strength, power and stamina but also it has anti-depressant properties. A recent Australian study on men with suicidal tendency shows that about 30% of such men had low testosterone levels.^{3,4} When these individuals were managed with Testosterone, their views about life were radically altered, from extreme pessimism to optimism. This has given firmness to belief as mentioned by TASA coordinator, Linda Byart- "Suicide in older men is often hormonally based and can be prevented by appropriate hormone replacement therapy"³ and the same is supported by Alison Mc Cook who has found that men suffering from Andropause are four times likely to suffer depression than other males with normal Testosterone levels.⁴

Women have a greater incidence and prevalence of depression than men. How this happens is not known exactly, but it has been hypothesised that testosterone increases the physical activeness, thereby allowing lesser time for retrospection. The concentration level also increases with testosterone making it more lucrative for use (and misuse for that matter). The attention span improves and the “reflex time” for both mental and physical functions reduce making the individual sharp.

The energy and vigour that testosterone awards, brings about restlessness in individuals. Although they may be able to accomplish more in shorter time-span, individuals with high testosterone levels are more likely to get flustered with delays/failures.

Irritable Male Syndrome (IMS)⁵ with its various symptoms of irrational anger, depression and loss of control is triggered by a sudden drop in levels of the sex hormone testosterone.

Introduction of testosterone results in mood stabilization, the person becoming easier to be around, more able to socially relate to others, and many other positive characteristics.⁶

According to Gerard Lincoln of the Medical Research Council’s Human Reproductive Sciences Unit in Edinburgh (U.K.) stresses such as bereavement, divorce or life-threatening illnesses could send testosterone levels plummeting. There are few human studies on stress and testosterone, he says, but numerous studies on animals, including primates, show that testosterone levels fall when stress sends corticosteroid levels skywards.

Sleep disorders

The Andropausic male may experience sleep disorders like insomnia. The affected individual may have interrupted sleep or less sleep.

Psychological Challenges in the Andropause

Undoubtedly, some psychological aspects have been dealt with in the preceding pages, however I present below the views of Robert S Tan in entirety for further discussion into the role that testosterone plays on our psychology.⁷

Throughout the life of a male there are several psychological issues that he struggles with, and these challenges are often amplified during the time of the Andropause: -

- 1. His sexuality*
- 2. His emotions*
- 3. His mind*
- 4. His courage*
- 5. His productivity*
- 6. His personality*
- 7. His character*
- 8. His boyish behaviours*

The sexuality of a youthful man aged between 15 to 30 years when his testosterone was at an all time high, drops to the ebb during the Andropause. Young men often have testosterone levels exceeding 1000ng/dl. Compare this with 80 year-old men, whose average testosterone is 200ng/dl. You might say the sexuality of a man in the Andropause is down 80%, a seemingly disastrous event. I have noticed that older men tend to be closer to their family and are more interested in domestic issues than when they were younger. It is as if the lack of testosterone makes them more "feminine". They take on more homely roles of cooking, cleaning and looking after children. More often than not, they devote much more time and attention to their grandchildren than they had previously to their own children when they were parents themselves. Perhaps it is because they have more time during the andropausic years as they have probably retired by then. They usually also have more disposable income, having saved most of their lives, and are more willing to enjoy little pleasures around

them, stopping to smell the roses. Their emotions become less "fiery" and take on a gentler aspect, so in a sense, the decline of testosterone enhances domestication skills.

In the andropausal years the mind becomes less sharp and nimble. The older male becomes less swift in mental calculations and his judgment is not as accurate as before. Perhaps he used to make razor-sharp business deals, but now he makes blatant mistakes and incurs painful financial losses. Oftentimes, he attributes it to aging, but in truth it may be partly due to the decline of testosterone. In more severe cases, the memory gets impaired too, and with time, dementia may even set in.

Although once willing to take risks of all sorts, the andropausal man becomes more conservative and fears treading in unclear waters. They no longer participate in roller coasters and bungee jumping, but rather watch these on TV instead. Most lose courage to take on new ventures and feel it is a time to retire and to "take it easy". However, fear and courage take on a different perspective in the andropausal years, especially in the older age group of the eighties and nineties. A study on fear was done whereby two groups of people were asked what they feared most. The younger group in the twenties said "death", but death was not what the eighty year olds feared most. It was their loss of independence. It is almost as if the elderly chide, "Death, where is thy sting?"

Productivity is at the core of a man's being. He feels happy when he creates something and is being noticed for it. He wants to feel contributory to his family and society. All his life he struggles to be the breadwinner for the family, and to get recognition at work for his efforts. In the days of early man, hunting and providing for his family and society was at the hub of function. For modern man, there may not be a need for barbaric hunting, but the board room still makes the same demands on his skills and abilities, and managing those complex business deals is akin to modern hunting. Andropause is a time of decline, when he is no longer as productive as he was before. Often he makes even less money than when he was younger, and feels threatened by younger more aggressive males biting into his turf. A man's personality may not stay the same over the years of his life. In younger days the fiery younger male is impulsive, intolerant and ambitious. With the passage of time, various

experiences and the fall in testosterone, quite a different male may emerge in later years. The red hot male often converts to a mellow yellow version, becoming more "feminine" and "domesticated", and taking on less challenges in the outside world, often preferring the cosy security of family and close friends. He is much less active, prefers his couch to watch television, and becomes weaker from lack of exercise. Deep inside every man is the desire to remain young and be that little boy that he once was. This may become more marked after retirement as usually there is more spare time at hand. The andropausal man may relive his childhood days, often to the amazement of his partner or spouse! The mischief may be an extramarital affair, a new red sports car, a sudden passion for toy train sets, riding a bicycle, which he hadn't done for years, and so on. Sometimes of these childish acts may even be mistaken for Alzheimer's dementia!

Cognitive Challenges in the Andropause

In my research, I found that the third most common reported symptom of Andropause was memory loss. It is not uncommon for patients who undergo the Andropause to report misplacing a key or forgotten important details. Often the memory loss is so minor it does not affect everyday functioning. This memory loss has sometimes been referred to as "age related memory loss" and is not as severe as Alzheimer's disease, (which is accompanied by loss of functioning). Memory loss in the andropausal years has been a research interest of mine. In my clinical studies, I have replaced testosterone in demented hypogonadic men (those low on testosterone) and have demonstrated improvements in their visual-spatial cognitive abilities. Although the study results have been presented at several scientific meetings, more research is needed before recommending testosterone as a possible treatment of certain dementia. Another researcher in Oregon has found similar results and he demonstrated improving cognitive functions with testosterone even in normal older men who did not have hypogonadism.

The Andropause is beginning to be accepted as part of aging. Coping strategies are important. Hormonal therapy for the symptomatic is available today but has to be carefully supervised by a physician.

Nervous System Manifestations.

1. Alzheimer's Disease.

Alzheimer's disease (AD) is a chronic, incurable, and unstoppable central nervous system (CNS) disorder that occurs gradually, resulting in memory loss, unusual behaviour, personality changes, and a decline in thinking abilities. These losses are related to the death of specific types of brain cells and the breakdown of connections between them.

Alzheimer's disease (AD) is characterized by the age-related deposition of β -amyloid ($A\beta$) 40/42 peptide aggregates in vulnerable brain regions.

Testosterone reduces neuronal secretion of Alzheimer's β -amyloid peptides. Testosterone supplementation, therefore, in elderly men may be protective in the treatment of AD.^{8,9}

2. Stroke

Men suffer from stroke in old age leading to paralysis of one side or the other of varying intensity. As indicated in the above News Report, low Testosterone is responsible for this affliction of brain. On reviewing other literature, I could not lay my hands on to this report, but it sounds reasonable and need further investigation.

3. Muscle cramps and Numbness.

I had experienced muscle cramps in different muscles. For the last nearly two years, I noticed there had been sudden and unexplained difficulty in swallowing the water. It was as if the muscles in the food-pipe had gone into spasm. This at times had

even given the feeling of choking. Now for the last six months, I had cramps in some muscles of hands, back, legs and the feet. The severity and duration of these cramps varied. After starting the treatment of oral testosterone, these cramps did not disappear and I started taking Vitamin E of my own. This helped a lot and the cramps have also disappeared within about getting Vitamin E along with testosterone. I am not sure whether the cramps were due to lack of testosterone or lack of Vitamin E. Further, these cases of muscle cramps need to be investigated for lack of testosterone. However, Vitamin E is probably essential as supplement.

During the period when I was diagnosed as having Andropause, I started having numbness of the distal parts of all fingers in both hands and similarly all toes of both feet simultaneously. This numbness (paraesthesia) would invariably happen in the early hours of morning, rather this would disturb the sleep. This happened for nearly two weeks because I thought that it might be due to andropause. For treatment, I had to take an injection of Vitamin B₁₂ (500 mg, intra-muscular) daily for almost two weeks and the numbness disappeared.

On reviewing the literature, I find that in Andropause there are deficiencies of various Vitamins and salts particularly Zinc, Magnesium and Calcium. These days, for treating andropause, Growth Hormone Replacement Foods are available, which is basically a composition of these salts and Vitamins. Kindly refer to the Growth Hormone Replacement (hGH) in the **CHAPTER XV**.

CHAPTER VIII

MUSCLES, BONES AND JOINTS

Testosterone is an anabolic Hormone that helps in building muscles, bones and connective tissues. This effect of Testosterone is known to the general public and has been often misused by professional weight-lifters and other sports persons to improve their performance by increasing their muscle mass, strength, and stamina.

A deficiency in Testosterone reverses these positive effects and brings about weakness in muscles, bones and connective tissues. With ageing connective tissue loses its elasticity and its constitution is changed for worse. “MIDDLE AGE MAN BECOMES STIFF”.

Effect on Posture

The onset of andropause brings about progressive rounding of the shoulder and loss of height. Simultaneous reduction in bone density may lead to vertebral collapse and kyphosis (forward bending of the spine).

Altered posture also affects the overall alignment of the structure in and around the spine. Back pain is a frequent complaint amongst people with low testosterone levels.

Another important aspect of andropause is the abdominal enlargement, particularly when the muscles of the rest of the body are wasted *en masse*. This is due to excessive fat deposition in and

around the abdomen that is added on to the already weak emaciated muscles of the abdomen.

Effect on Muscles

Most of the andropause patients present with mild to severe pain in muscles that is not relieved by rest. Such pains may be reduced temporarily by using pain-killing drugs but such measures are severely limited in their efficacy and utility.

The muscles also lose their normal conformation because of wasting; most apparent in the thighs and calves. These muscles become weak losing their strength, power and endurance. Many people would have experienced a gradual slowing down of their walking speed and loss of distance one can travel which they would have attributed to ageing. They would also have experienced difficulty in climbing stairs, getting up from low seats or have a feeling of instability in legs while walking. This however, could be because of lowered testosterone level that is normally not appreciated as a causative factor in the society as a whole. Overall, the muscles not only have a reduced working capacity, but also their “reaction time” to contract increases thus causing slowed movements than these individuals would have normally had.

Some of the muscles of the body are tender to touch. The muscle tone in andropause men also goes down resulting in flabbiness. The patients commonly complain of cramps of variable intensity especially in the lower leg and feet. The cramps occur particularly when used suddenly against resistance.

Effect on Tendons.

The tendons lose their elasticity and stretchability. This is particularly felt on Tendo-achilles. On walking for a short distance the tendons of the lower limbs become painful. If cases of tendon ruptures in old people are investigated lack of testosterone may be one of the important causes.

Effect on Ligaments

In andropause, ligaments also lose their elasticity. Therefore it may be one of the causes of stiffness of the joints. In foot small bones join together through ligaments. Since the ligaments become stiff the brunt is on the bones to bear the strain on walking. This whole process makes the feet painful on walking a short distance.

Effect on Joints.

Early: The andropause male usually has morning stiffness of various joints particularly that are used for weight bearing or carrying loads. At this stage usually, there is no limitation of movements of these joints. The pain in the neck and back is due to multiple factors namely, osteoporosis, receding muscle support and changes in posture.

Late: If andropause remains undiagnosed and untreated, the resultant effect is on the joints wherein the joint cartilages are subjected to abnormal shearing forces. With concomitant alteration in the basic composition of the joint cartilage, the purpose of providing smooth movements is lost leading to painful movements. Testosterone also potentiates the immune system of the body thereby reducing the risks of developing auto-immune disorders like Rheumatoid Arthritis of old age and other autoimmune diseases that may affect the joints.

Effects on Bones

In a healthy individual, bone tissue is constantly being broken down and rebuilt. In men, testosterone is thought to play a role in helping to maintain this balance.¹ In an individual with osteoporosis (low bone density), more bone tissue is lost than is regenerated and it is estimated that between the ages of 40 and 70

years, male bone density falls by up to 15 percent. Wrists, hips, spine and ribs are most commonly affected. Even other bones are affected because andropause affects all bones of the body in general. Due to this, the individual may have severe pain in the bones adjoining the joints or anywhere including generalized tenderness of some bones or the other.

We have all heard of women having weaker bones and suffering fractures easily after menopause that has been attributed to osteoporosis. Unfortunately, with advancing age and declining testosterone levels, men, like women, seem to demonstrate a similar pattern of risk for osteoporosis. What's more, approximately one in eight men over the age of 50 years suffer from osteoporosis.

Low bone density puts one at risk of frequent fractures, associated pain, and in many cases, loss of independence. The fracture related problems of andropause have important social and economic implications, and therefore, represent a significant health care burden. In Canada, 20-30 percent of osteoporotic fractures occur in men. The incidence of hip fractures rises exponentially in ageing men, as it does in women, starting about 5 to 10 years later. These need special attention (especially fracture of the neck of femur i.e. thigh bone) in the form of regular assessment of testosterone levels. Particularly, up to one third of hip fracture patients never seem to regain full mobility and close to 40% male patients with hip fracture patients die within one year. Testosterone compliments usual fracture management to decrease the morbidity and mortality, thereby adding on to a comfortable old age.

CHAPTER IX

SEX AND SEX ORGANS

Sex

Testosterone secretion decreases with ageing. This effect demonstrated by numerous studies leads to sexual involution in men, characterized by weak libido, weak penile erection, poor frequency of sexual intercourse, impotency, ejaculation problems, phimosis (tightness of the retractable foreskin of the penis leading to painful intercourse), sclerosis of penis and sometimes gynaecomastia (enlargement of breasts).

The Penis & Erectile Deficiency

Testosterone plays a major role in the development of secondary sexual characters including the development of the size of the penis. Testosterone is the hormone of 'Performance' as it excites desire, causes a strong erection to perform the sexual intercourse successfully and satisfactorily, provides lubrication prior to ejaculation, causes ejaculation and is responsible for orgasm. The powerful and spicy effect of testosterone is beyond the scope this book that can be better described by the poets or philosophers.

Dwindling He Hormone levels take away the libido and performance. Due to lack of Testosterone the penis is deficient in erection. It may have weaker erections or may not erect at all. The size of the penis in flaccid position may also reduce in size thereby affecting the overall length of penis once erected.

In andropause loss of libido is the earliest sign and if low level of testosterone continues for long time it affects the erection and the size. Because of these reasons some of the patients of andropause may not have Erectile Deficiency though they may have loss of libido.

Prostate

As per Dr Michael Schachter M.D ¹ -

“Testosterone works directly on many tissues of the body. But, dihydrotestosterone or DHT, a hormone derived from testosterone, is much more potent than testosterone, and acts on the prostate gland and other sexual organs. DHT is produced within the prostate gland and some other organs from testosterone by the enzyme 5-alpha reductase. Without DHT a male would not develop his external sexual organs or his prostate. DHT is necessary for the normal growth and development of the prostate. Its presence is also necessary for the pathologic enlargement of the prostate, known as benign prostatic hyperplasia (or BPH) in older men. Because the presence of DHT is necessary for the development of BPH, a recent therapeutic approach to treating this condition is to reduce the formation of DHT by blocking the enzyme 5-alpha reductase. This can be done by the new, highly promoted drug finasteride (or Proscar), which has been approved by the FDA for this purpose. The herb serenoa repens (or saw palmetto) also has this effect, as one of its actions. What is not discussed in the literature of these 5-alpha reductase inhibitors is that testosterone may be converted to one of two compounds. The first is DHT as we’ve been discussing. The second is estradiol, the female sex hormone. So, a blockage of DHT formation, may lead to an increased level of estradiol via the enzyme aromatase. Increased levels of estrogen may play a role in the development both of prostate cancer and BPH.

The position of most urologists has been to view the therapeutic use of testosterone, especially for men with enlarged prostates, with great skepticism, since its presence is needed for the

development of a benign prostatic hyperplasia or BPH. Other reasons for urologists reluctance to use testosterone include: (1) early testosterone enthusiasts promoted the belief that testosterone held the key to the fountain of youth, a view ridiculed by conventional medicine, (2) the fact that since the 1940's, it has been known that the growth and spread of prostate cancer was largely dependent upon the presence of testosterone, and (3) the abuse of testosterone analogues or anabolic steroids by athletes, resulted in the FDA classifying testosterone and derivatives as dangerous drugs.

Although the predominant view about benign prostatic hyperplasia or BPH is that it is due to a buildup of DHT, this hypothesis is far from proven. Two conditions must be present for BPH to occur. They are: (1) a man must be at least in his forties or fifties, as it never occurs in younger men, and (2) DHT needs to be present for BPH to occur. But, as men grow older, their blood levels of testosterone and DHT tend to decrease rather than increase. A more characteristic finding in BPH is that estrogens and the estrogen to testosterone ratio tends to increase with age in men. It is this increased ratio of estrogen to testosterone that may be more responsible for the development of BPH and prostate cancer than DHT and testosterone.

Dr. George Debled's Testosterone Treatment
This is the argument presented by European urologist, George Debled, M.D. Since the mid 1970's, he has run a clinic for men, which specializes in sexual dysfunction and prostate problems. During this time, he has treated approximately 2,000 patients. On all of these patients, he orders a battery of blood tests, which he calls a male hormonal profile. What he's found is that young men with impotency or libido problems often have hormone profiles similar to older men with similar problems and BPH. Testosterone and especially free testosterone levels are reduced and other hormones, such as estrogen and prolactin are increased.

Dr. Debled points out that testosterone is necessary to nourish all of the tissues of the male urinary and reproductive systems, including the prostate. It nurtures the development of muscles and is necessary for proper muscular functioning. When the muscles of the bladder and the prostate do not receive sufficient testosterone, they tend to function poorly, atrophy and fibrose. This may then help to explain some of the symptoms of BPH. Rather than trying to inhibit the formation of DHT, Debled administers testosterone to all of these patients. Having successfully treated over 2,000 patients with impotency and prostate problems over the past 15 years, Dr. Debled believes that he can forestall BPH surgical procedures for at least 10 years by giving men testosterone. He has also noticed that his patients have a much lower incidence of prostate cancer than would be expected, suggesting that testosterone rather than causing cancer may actually be a preventive.”

CHAPTER X

GENERAL BODY EFFECTS

Universality of the androgen receptor¹

The androgen receptor is identified in a variety of organs: the seminal vesicles, the hair follicle, the sebaceous glands, the foreskin glands and more generally all secondary sexual organs, the testicles and the epididymis, the uterus and the ovary, the kidney, the submaxillary glands, definite cerebral areas as the hypothalamus, the pituitary gland and the cerebral cortex, the *levator ani*² muscle and the skeletal muscle, and the bone marrow. In reality small quantities of androgens' receptors have been observed in numerous organs.

In Andropause overall the health goes down. The stamina for work goes down. One loses interest in the work. The agility is reduced. It is often noted that the senior officers few years before their retirement may be seen dosing off on the chair. People have been seen dosing off during the course of the meetings. It looks the Government has rightly thought of fixing the retirement age. It is because the efficiency of the middle aged old man is certainly reduced both physically and mentally.

Andropausic gait

The elasticity and the stretch-ability of muscles and tendons are reduced. When this is coupled with the weak muscles of calf, thigh and the foot muscles, the normal springiness of the gait is lost. One would be walking on a wider base in a slow and painful pace.

The pain is felt earlier on the tendons than the muscles particularly the Achilles tendon (not normal gait of heel strike, foot flat and toe off).

Hair

The growth of hair is reduced, the hair become thinner and grey. An andropausic individual may complain that he goes to the barber less often than earlier. Similarly it be noticed that he may not feel the necessity of shaving the beard daily and regularly. Similarly the hairs on the rest of the body are also reduced.

Skin

The skin all over the body becomes dry. The thickness of the skin also reduces. It reduces its elasticity and the shine. The skin rather looks darker. Since it loses its elasticity and proper thickness it starts getting wrinkled all over the body but this is more evident on the face. If one lifts up the skin over the back of the hand it can easily be pinched; since it has lost its elasticity, it takes time to gain its original tenor.

There are more chances of getting skin infections because the usual protection of the connective tissue to the skin is dampened. The loss of skin elasticity also takes its toll on the skin covering the *glans* (tip) of the penis leading to phimosis.

Due to the combined effect of the amyotrophy of the muscles and loosening of the skin, different facial crease of the forehead and the face become prominent. The cheeks also pucker in. Physicians experienced in managing the aged would be able to appreciate the facial changes of the andropausic male better.

Death and Disability

With advances in knowledge and practice of medicine, the average age of the population is increasing, with number of people around and above 50 years increasing gradually. In India the average lifespan of males is 62 years compared to 65+ of their female counterparts. The high morbidity associated with ageing

population is of great concern in the Public Health as well for the policy makers. This is just the Indian aspect of a global scenario. In

France where the average lifespan for men is 73 years and women is 81 years, one in four persons dies before the age of 65 years. After the age of 50 years, the main causes of death are¹:

- ❑ Heart related illnesses.
- ❑ Senility and
- ❑ Cancers.

These problems are characterized by cellular deterioration, deterioration of the arteries and heart muscles, deterioration of the cerebral nervous fibres and reducing immunity levels that encourage growth of cancerous cells. Death usually occurs after 20 years of the start of these deteriorations. The consequence of these illnesses is recurrent disability that takes its toll not only from psychological point of view but also from a broader socio-economic perspective.

The deregulation of sugar, fat and protein metabolisms also has a devastating effect on the individual.

Obesity

Obesity follows fat accumulation. It has been seen that obese men have lower testosterone levels in the blood (Table 4).^{1, v} The degree of sub-normality is proportionate to the degree of obesity. Zumoff and colleagues conclude “Hormonally speaking, the distinction between morbid obesity and lesser degree of obesity would seem to have no validity; the decline of free, non-SHBG-bound, and total testosterone levels in obese men represents a continuum, observable at any degree of obesity.”^v

Because the testosterone secretion decreases with age it seems logical to believe that this phenomenon is a leading cause of fat deposits everywhere in the body and that being overweight is a clinical sign of andropause.

Table 4: Plasma testosterone in obese men.

<i>Subjects</i>	Plasma testosterone levels (ngm/100 ml)
Obese group (200 – 280 % of ideal body weight)	223
Control group (85-135%v of ideal body weight)	599

Lungs

Normal breathing is a result of good elasticity of connective tissue of the lungs. Respiratory muscles in good condition are also necessary for a good respiration. Connective tissue deterioration and amyotrophy of the respiratory muscles in andropause leads to breathing problems¹.

During the initial periods of my distress, I often became breathless after climbing some flight of stairs or walking even short distances. Now having found andropause to be the main reason behind my plight and taking the appropriate remedy, the breathlessness has suddenly vanished.

Immunity

Testosterone stimulates immunity. A decrease of androgens' secretion induces a lack of production of lymphocytes leading to chronic infections and cancer. Testosterone therapy can be of the most importance in HIV viral illnesses (AIDS) when the patient is weak, stressed and deprived of lymphocytes.

Another role of testosterone is to help regulate the immune system.⁵ Patients with autoimmune disorders, such as rheumatoid arthritis, systemic lupus erythematosus and multiple sclerosis appear to benefit from testosterone. It has been used to improve appetite,

increase weight in malnourished patients, improve wound healing and increase resistance to infection.

Eyes

It has been seen that in andropause the acuity of vision is disturbed particularly the peripheral vision. Moreover it has also been that lack of testosterone causes dryness and itching in the eyes as if the secretion of the tear glands is reduced in the eyes.

I personally had been having the dryness of the eyes for the last 2-3 years. As mentioned in my story earlier while driving the car particularly at night my wife always feared that I might not hit a cyclist or the side of the car on my left while overtaking.

Both these symptoms have improved after taking testosterone. However, I am not sure if these problems are related to lack of testosterone. This issue needs further investigations before being authenticated.

Fundoscopy examination of the retina of the eye may have bearing in diagnosing the cases of Erectile Deficiency. A latest report by George W. Drach, MD⁶ on 15.12.2003 (Reuters Health) has mentioned that Erectile dysfunction may be related to generalized atherosclerosis which afflicts the penile vessels. He further mentions that Dr. Y. Kawanishi and his co-workers at Takamatsu, Japan, Red Cross Hospital used fundoscopic evaluation of the retina to detect possible atherosclerosis in a study of 72 men with erectile dysfunction (ED).

CHAPTER XI

FALL-OUTS

"Age is too high a price to pay for maturity."

- Anonymous

I am sure that by now, it would be clear to all that Andropause is a mosaic of afflictions and it is not necessary for everybody to have the same sign and symptoms. However, what is certain is that all males will have Andropause. As submitted earlier, Andropause is preventable and treatable. As an ageing myself, I can see and feel the potential impact that plummeting Testosterone levels can have effect on an individual, his family and the society. Also, I can see the potential benefits of initiation measures to counter Andropause at prophylactic and therapeutic level. Individual interpretations may vary in what these possibilities might be and in the same vein, I convey my opinion over the subject.

Downfall

I would not be wrong in saying that most of families on this planet are male-centric. This is as true for humans as for majority of species in the animal kingdom. Given the role that a man plays, as the provider and protector, he has been duly acknowledged by being bestowed the authority and command in household. I do not wish to conjure up a controversy, but in reality the female role has been that of a preserver. His personal leadership over the family is bolstered by his innate capabilities of initiating the reproductive

cycle and more importantly by his ability to gratify the physical needs of his partner. In today's society that is rapidly changing its moral attributes and promiscuity becoming prolific for either sexes, the latter ability becomes more pertinent. At a personal level, a man has a lot to lose by virtue of being Andropause. His debilitations influence his work and productivity. His weakness impinges on his protective competence. He no longer enthuses the vigour in his family. With his physical prowess on the decline, his partner may reciprocate by reduced indulgence in copulation and diminished support. His position as leader of the herd becomes susceptible. Breakdown of marriage might be imminent. As it is a man with lowered Testosterone levels becomes depressed and to top it the altered family equations may plunge him into an abyss from where it might be impossible for him to recover. Under such duress it is quite relevant that he should contemplate drastic measures like suicide. I think that women can contribute positively in preventing Andropause from setting in their partners. Women are more sensitive than men in general and therefore, they can sense the subtle changes in a man as he quietly slipping away into the realms of Andropause.

India is a developing nation with its economic roots still firmly entrenched in the agricultural industry. With India still holding on to its traditional values, the majority of womenfolk are still confined to their households. It is plausible to presume therefore that the ride towards development is being energized largely by male fuel. A nation like India has a lot to lose socio-economically with "Ageing". With Andropause his productivity reduces and his physical contribution towards social and national progress regresses thereby making this male-fuel less efficient. This is a vicious cycle of plummeting individual productivity, reducing Gross Domestic Production and falling Per Capita Income.

I would again like to quote my physician friend that "Andropause is an epidemic" and I would like to add that most of us medical professionals do not realize that this epidemic is

perpetuating right under their very noses. What we callously pass off as “Ageing” does incur huge loss in personal and national income. To rub in the salt, the solution to most of these problems is as simple as an injection given once a month or a capsule taken twice a day. It is universally acknowledged that “prevention is better than cure” and as any Public Health specialist would concur, the benefits of prevention go far beyond economic constraints. When we can see that preventive initiative like ‘Breast Screening Programmes’ is doing wonders in reducing the risk of developing Breast Tumours and its sequelae, why can we not have something for the growing population like ‘Testosterone Screening Programme’ that screens their hormonal levels and identifies the men likely to have Andropause related problems. Not only would this save money but also time for a overburdened national health system. By the amount of time that my medical colleagues are spending in taking care of “Age-related problems” and the amount of stress that they undergo in their daily professional lives, I think that a National Andropause Programme would also save them from getting Andropause.

Benefits

Having said so many things about what may happen if we do not treat Andropause, I am myself aware that all is not lost for somebody who has Andropause. As mentioned in **Chapter XV** there are several option to combat this syndrome. Most of the benefits that I do attribute to treatment of Andropause are through first hand experiences on patients with low Testosterone levels, besides of course the review of literature.

A man with optimal/ good levels of Testosterone is buoyant, vibrant and energetic. His sharpness of mind and oozing confidence make him a “Social Hit”. His family life is more rewarding and he maintains his command over his herd. The vigour itself is a natural antidote for depression and with the added benefits of confidence and up-swinging personal and social life, the possibility that he may develop depression is remote. This

augments well for everybody – the family, the employer and the nation. We all stand to benefit.

The stress and strain that a male undergoes to provide and protect his family is different from that of the housewife who has to preserve. Our world today is fiercely competitive and with the rising rate of unemployment, there is always a masked fear of losing out. It is Testosterone only that helps him survive this continuous barrage of pressure situations. It follows that greater the stress and strain, faster the depletion of Testosterone reserves will happen and more quickly would Andropause set in. In a recent newspaper report, it was mentioned that urban male especially of the metropolitan cities are more likely to develop Andropause. These today are the epicentres of our development. Initiatives that maintain or restore the Testosterone levels in urban males therefore would keep us on track towards the status of developed nation, other factors notwithstanding of course. On one hand we have a trend of having Gymnasiums/ Health Clubs within the Office Complex that can be seen with Multi-National Companies and several Indian corporate houses. Although, a generation of the developed countries, this trend has percolated down into the Indian society as well. The rationale is to increase productivity by keeping the employees fit and healthy provision of healthy ways of venting their stress and rigours. In a relaxing atmosphere, exercise will only benefit by increasing the endocrinal activity. However, similar effects can also be achieved if the environment is made suitable and a healthy diet that stimulates endocrinal activity to boost production of hormones like Testosterone.

As and as we are becoming more aware of the effects of Testosterone, or the lack of it, new horizons of Testosterone Therapy become evident. There were recent reports of Testosterone being good for the patients of HIV. Although the indication that the said report gave was *vis a vis* depression, I see the potential benefit in another vein. Testosterone also bolsters the immune system and therefore may prevent/delay the development

of AIDS in a HIV positive individual. This would be as applicable to other infections also. If not the infections of serious kind, we can atleast do away with minor irritants like common cold or sore throat. A delicate balance between Anabolic and Catabolic reactions exists in our body that might be the crucial factor for allying or causing cancers. When the Catabolic reactions start outweighing the Anabolic reactions, abnormal alterations start taking place in us. Testosterone is a natural Anabolic Steroid. Thus, to my mind its relevance in our fight against cancer is tremendous.

We have to realise that the menace of Andropause is growing and that this is probably the best time to stop it from flexing its muscles. Nipping the problem in its bud would only help us in maintaining the personal and social fabric of our country intact. If I were to conclude my feelings about Testosterone therapy in the growing males, I could sum it all up in –“ **Two capsules a day keep the doctor away**”.

CHAPTER XII

CAUSES

The causes of the deficiency of testosterone in the male body can be innumerable. Some of them are described below:

- ❑ The effects of aging on testosterone production - Andropause
- ❑ Testes-Based Conditions
- ❑ Pituitary/Hypothalamus-Based Conditions
- ❑ Genetically-Based Conditions
- ❑ Miscellaneous causes

The effects of aging on testosterone production — Andropause

As men age, their ability to produce testosterone declines.^{v, v} Some men's production of LH decreases with aging, which lowers testosterone production. Moreover, a protein called sex hormone binding globulin (SHBG) increases in older men, which reduces the amount of free (unbound) testosterone in the blood that is available to tissues, such as muscles.

Aging also causes changes in the daily cycle of testosterone production. For example, younger men show a peak of testosterone in the morning, but this finding is blunted in older men.

Testes-Based Conditions

Men whose testosterone deficiency is caused by an abnormality in the testes often display increased FSH levels, increased LH levels and impaired sperm production. These conditions include:

- ❑ *Trauma* – a direct physical injury to the testes may damage the cells that produce testosterone.

-
- ❑ *Orchitis* – testicular inflammation can occur after a post-puberty bout with the mumps (there is a higher risk of risk of infertility than low testosterone.)
 - ❑ *Radiation treatment or chemotherapy* – these therapies for other diseases may damage the testosterone-producing cells of the testes.
 - ❑ *Testicular tumours* – treatment of testicular tumours may directly affect testosterone production.

Pituitary/Hypothalamus-Based Conditions

Men whose low testosterone levels result from defects in the pituitary or hypothalamus generally have a low or low-normal FSH level and low or low-normal levels of LH. These conditions include:

- ❑ *Pituitary tumours* – the growth of abnormal tissue in the pituitary can disrupt the gland's normal functioning and interfere with hormone production.
- ❑ *HIV/AIDS* – viruses or other infectious agents may directly or indirectly affect the hypothalamus, pituitary or testes and can decrease testosterone levels; as many as 50 percent of men infected with the human immunodeficiency virus (HIV) may have low testosterone.

Genetically-Based Conditions^v

Men may have low testosterone as a result of chromosomal abnormalities or genetically-based conditions. These conditions include:

- ❑ *Klinefelter syndrome* – a genetic condition in which an extra X chromosome is present (about one in every 400 men have this); testosterone production is low to low normal; men with this syndrome also may have markedly reduced bone density.
- ❑ *Kallmann syndrome* – usually a recessive genetic disorder associated with the X chromosome, which occurs in about

one of every 10,000 men. A deficiency of GnRH impairs the release of LH and FSH, which decreases testosterone production; men with the syndrome lack the sense of smell; testes do not enlarge at puberty.

- ❑ *Prader-Willi syndrome* – a genetic disorder characterized by decreased muscle tone in infancy that improves with age, underdeveloped genitals (including undescended testes in boys) and low sex hormone levels. An obsession with food and compulsive eating, also linked with this disorder, may begin before the age of six.
- ❑ *Myotonic dystrophy* – the most common adult form of muscular dystrophy, this genetic condition only occurs in men and is carried on the Y chromosome; because testicular failure usually occurs around the age of 30 to 40, men may have sons at risk for the disease.

Miscellaneous Causes

- ❑ Generalized vascular diseases such as diabetes and perhaps even problems caused by heavy smoking.
- ❑ Diseases when the immune system attacks and destroys the testis such as variations of Systemic Lupus Erythematosus.
- ❑ Viral infections such as mumps (which fortunately has been eradicated by immunization).
- ❑ Stress, excessive alcohol, overweight and lack of exercise add to the general effect of ageing. Stress conditions such as change in jobs, change of place and depression etc.^v

Environment⁵

Development of man has brought about its own disadvantages. Pollution is something that strikes our mind in the first instance. Our current environment is laced with hydrocarbons that is chiefly of petrochemical origin. The compounds mimic the female hormone in functioning and are extremely potent. They have penetrated our food chain and us through widespread use of fuels,

pesticides, herbicides, fungicides, plastic, clothing, bug/ mosquito sprays and personal care products. Such synthetic hormones have molecular structures that are not compatible with our physiology. We do not have enzymes to modify their effects, nor can they be efficiently excreted. Therefore these synthetics can have an unusual and far more potent hormonal effect on our body systems than the natural hormones.

Once inside our bodies, they counteract the masculinizing effects of Testosterone and cause precipitation of andropause symptoms especially in males who already have below average levels of Testosterone.

Surgical Causes

Surgical removal of or surgical injury to the testis and male reproductive tract (including hernia repairs, prostatectomy etc.). Vasectomy however needs special reference in light of the recent findings as given below.

Vasectomy:

Vasectomy is a seemingly simple operation, a real snip, which couldn't possibly go wrong - or could it? It is often presented as the ideal and infallible solution to family planning. What could be simpler than tying the vas, the narrow tubes carrying the sperm from the testicles to the prostate, where the seminal vesicles add the other ingredients of the seminal fluid making up the ejaculated semen? No sperm - No problems.^v

By this procedure, therefore, the exit of sperms is stopped. It is widely thought that since the blood vessels are not cut and testosterone levels in the blood remains normal, vasectomy will not have any effect on sexual desire and performance.^v Unfortunately, it's not quite that easy. The testicles, as any man will testify, are very delicate and sensitive structures. They are very complex organs, with a rich nerve, blood and lymphatic supply. Also they are under intricate hormonal and temperature control to regulate sperm and testosterone production. So that the man doesn't produce

antibodies to his own sperm, which to the rest of the body is foreign protein, there are important defences keeping the sperm isolated from the immune system. All these systems can be disrupted, even when the vasectomy seems to have gone smoothly, and there can be an alarming variety of short- and long-term complications, which can sometimes be serious.¹

Short Term Complications: Post vasectomy pain syndrome - This fortunately rare complication can turn a previously fit man into a chronic invalid. Even if the operation was painless, and not accompanied by the bruising and immediate post-operative discomfort which is quite common, weeks, months or years after the operation, nagging pain begins at the site. Sometimes tender cysts, or lumps called granulomas, can arise around the cut ends of the vas, and even if further surgery is performed to cut them out, the pain persists. This can be one of the most difficult problems in andrology to treat, especially as the precise cause is usually unknown.

Long Term Complications: Vasectomy was popularised in the 1920s by Ludvig Steinach, who suggested that the removal of 'redundant sperm producing cells' would stimulate the production of testosterone that has been known even then to bless man with vigour and vitality. However, the recent evidence contradicts this notion and actually shows vasectomy to actually reduce the testosterone production thereby contributing directly to the onset of andropause. Moreover, according to the current literature on human anatomy, the *vas deferens* do not have any role in sperm production and they merely function as portals of sperm transfer.

A consistent opinion amongst doctors advocating testosterone treatment for andropause is that vasectomy brings about male menopause at an earlier age. It is believed that the incidence and prevalence rates of andropause in patients with vasectomy is twice as high as that in the general population. A global survey conducted on the internet 35% people with

andropause admitted having had vasectomy. This rate was 45% in Australia alone.

Though again the mechanism of this reduced hormonal production is unclear, the most likely cause seems to be an auto-immunity to sperm released into the tissues after the vasectomy,^{6,7 8} an immunological time-bomb ticking away. More research is needed to prove how this happens and how it can be treated. Reversing the vasectomy does not seem a good idea, as the damage is done early on, and attempts at reconstructing the vas may only stir up further trouble, more pain or more antibodies.

CHAPTER XIII

DIAGNOSIS

"It is not the age which leads to the decline of hormones, it is rather the decline of hormones which leads to ageing."

Generally, a blood test needs to be run in order to diagnose andropause. After the age of 50, the average testosterone level decreases at a rate of approximately 1% per year.¹ However, if only absolute testosterone levels are evaluated, many patients with andropause will be missed. There may be an increased level of sex hormone-binding globulin that binds the testosterone and makes less of it available to the tissues. Also, as men get older, there is less of a daily rhythm to the secretion of the testosterone. Younger men have higher testosterone in the morning, which then decrease as the day wears on. In older men, this curve is flattened, leading to steady low levels of testosterone throughout a 24-hour period. Here are some issues regarding testosterone that are important to remember:

- 1) It is not yet known what level of serum testosterone defines a deficiency in older men. Generally it is accepted that two standard deviations below the normal values for young men is considered abnormal.

- 2) A man may have large variations in his serum testosterone levels over time. He may have normal testosterone

levels one day and have decreased testosterone levels the next, so it is important to look at hormone levels over a period of time.

3) In older men, affected organs may respond differently to androgens.

Not all men will need the same level of testosterone to maintain proper function of their brain, bone, prostate or muscle cells etc. Therefore it would be incorrect to say that there is one standard level of testosterone that should be achieved by all men. Rather, the patient and the physician working together need to find the level of testosterone that is most effective for the particular patient.

There remains significant controversy as to how best to measure testosterone levels and diagnose andropause. It is well accepted that if total testosterone is less than 200 ng/dL, a man will be considered as having a low testosterone level. If his total testosterone is greater than 600 ng/dL, low testosterone may be ruled out.

Table 5: Laboratory values of hormones

	Gender	Age	Mean	Normal Range
Total Testosterone	Men	20-49 yrs	1002	270 – 1734 ngm/dL
		+50 yrs	483.5	212 – 755 ngm/dL
	Women	Ovulating	91.5	63- 120 ngm/dL
		Post - menopausal	81	49 – 113 ngm/dL
Free Testosterone	Men	20-49 yrs	31.69	8.69 – 54.69 pg/mL
		+50 yrs	---	-----
	Women	Ovulating	1.74	0.29 – 3.18 pg/mL
		Post - menopausal	0.97	0.20 – 1.73 pg/mL

At this point of time, it appears that the best measurement of androgen status is either “free testosterone” or “bioavailable testosterone.” However, these can be measured in different ways. The analog free testosterone method is the most commonly used in the United States by most commercial laboratories. It is not considered an accurate way of measuring testosterone. It would appear that the best measurement of hormonal status is either free testosterone or bioavailable testosterone. These measurements may only be available through special laboratories.

It is important to remember that there is significant variation in the recommendations as to what tests should be used in order to establish a biochemical diagnosis of andropause. However, it is widely accepted that the blood work should be done in the morning preferably fasting to capture the potential peak values.

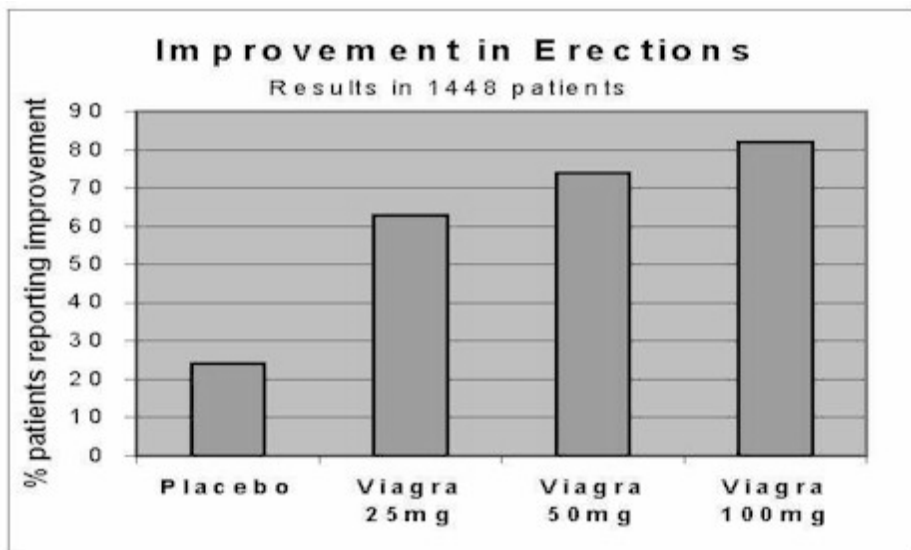
CHAPTER XIV

VIAGRA

In most men suffering from Andropause, low sexual performance or weaker erections of the penis (known as Erectile Deficiency) is the chief concern. Although the last problem to be revealed by the patient, this is the most disturbing aspect of Andropause for most of them. Treating these patients with Testosterone alone has been found to be very rewarding. However, in some of the patients high doses of Testosterone may be required to achieve the desired effects. As with any medicine, it is granted that there may be patients who may not improve in their sexual performance inspite of taking Testosterone. These cases that do not respond well to Testosterone therapy have Erectile Deficiency probably due to causes other than Andropause. For such patients Viagra seems to be a more pertinent choice.

Viagra is one drug that has gained tremendous popularity in this field. Although a recent entrant into the field, it has already benefited more than 16 million men globally.¹ With an efficacy rate as high as 80% as propagated by the manufacturer, it has been shown to work in Erectile Deficiency irrespective of the cause and frequency of the problem and age of the patient.

However, as a word of caution needs mention here that the improved effectiveness corresponds to the dosage of the medicine administered. As a study done on 1448 patients shows, almost 100 mg of Viagra is required to achieve 80% success rate.²



Although both Testosterone and Viagra are treating Erectile Deficiency, their mechanisms of working are radically different. Viagra solely operates by increasing the blood flow to the penis thereby causing stronger erections that may be longer lasting than usual. Testosterone on the other hand is the hormone of desire in men, the lack of it causing loss of libido. The desire and sexual excitement that Testosterone generates, promotes the production of nitric oxide and thereby the genital blood flow. Thus where Testosterone provides the intent and background for sexual activity, Viagra provides the tool for it. This is why it has been advocated that a combination of the two would work better both in theory as well as practice. It has also been seen that combining Viagra with Testosterone yields a success rate as high as 98% in cases of Erectile Deficiency irrespective of cause, frequency and age of patients. Moreover, the quantity of either drug (given in combination) required to achieve this high success rate is also much lower than if given individually.

It is worth mentioning that on its own Viagra only treats one symptom of Andropause i.e. Erectile Deficiency; the other features of andropause like low libido, reduced mental and physical energy, irritability and night sweating would go untreated with Viagra alone. Although testosterone may have a weaker effect on erection *per se* its uses are more holistic when it comes to improving sexual performance, not to mention the other beneficial effect of Testosterone therapy on other systems of the body.

CHAPTER XV

TREATMENT

"You can't turn back the clock. But you can wind it up again."

- Bonnie Prudden

It is established that Andropause is due to deficiency of bioavailable (free) Testosterone. Therefore, the obvious treatment would be to give Testosterone to the afflicted individuals.

Before suggesting Testosterone, a total hormonal assay of these individuals is essential. This is to provide the baseline value of different hormones that may also change after giving Testosterone. Moreover the dosage of Testosterone would depend upon the baseline level of Testosterone. Both to establish the diagnosis and to monitor the treatment properly, laboratory measurements of the sex hormones and the complex range of factors regulating their action, together with tests of blood fat, liver, kidney, and prostate function and haematology profile, all need to be checked before treatment and at each follow-up assessment.

The quiz is only to give a rough estimate for the individual and to warn him to consult his physician if he falls in line so that he is saved from the long-term serious effects of Andropause. The earlier this treatment is taken the better it would be at the end. **Testosterone Replacement Therapy (TRT) is most effective when right dosage is given at the right time.**

The role of treatment actually is that rest of the endocrine system should be balanced. This may involve the administration of thyroid hormone, DHEA or physiologic doses of cortisol. Some

recent studies on ageing indicate that the administration of optimal doses of human Growth Hormone (hGH) may also be extremely useful when it is deficient. Male Andropause is largely a preventable and treatable condition. **It is urged that a physician be consulted before any form of treatment/ therapy is started.**

Besides the medicines *per se* a comprehensive approach that emphasizes lifestyle, including an optimal diet, nutritional supplements, exercise, stress management, reduction of smoking and alcohol, detoxification procedures and energy balancing is more important. Recently anti-oxidants have outweighed all other treatments claiming that even the serious diseases can be controlled with anti-oxidants alone.¹

Testosterone Replacement has been shown to be very effective in improving the physiological and psychological functions of the individual, as enumerated below: ²

- ❑ Improvement in mood and sense of well-being
- ❑ Increased mental and physical energy
- ❑ Decreased anger, irritability, sadness, tiredness, nervousness
- ❑ Improved quality of sleep
- ❑ Improved libido and sexual performance
- ❑ An increase in lean body mass, a decline in fat mass
- ❑ An increase in muscle strength (hand grip, upper and lower extremities)
- ❑ Potentially, a decrease in the risk of heart disease

With Testosterone therapy, one's attitude improves, reinforcing self-esteem and self-confidence at work, as well as an increased energy at home and in social activities. Most men will feel more vigorous, experience improved energy levels, mood, concentration, cognition, libido, sexual performance and an overall sense of well-being. These effects are usually noted within 3 to 6 weeks.

Other potential benefits include maintenance or improvement in bone density, improved body composition, muscle mass and muscle strength, as well as improvement in visual-spatial skills.

Testosterone Replacement Therapy

Testosterone replacement is available in following forms:^{3,4}

Pills

- ❑ Methyltestosterone (Android, Virilon, Testred, Oreton) 10mg, 25mg (**not recommended**)
- ❑ Testosterone undecanoate (Restandol, Andriol, Nuvir) 40mg, essentially a testosterone in oil preparation
- ❑ Mesterolone (Proviron) 25mg -- less potent

Transdermal Preparations

- ❑ Testosterone (Testoderm, Testoderm TTS, Androderm)

In transdermal testosterone, the hormone is released slowly through the skin to deliver a constant level in the blood, again not a routine pattern, but convenient. Transdermal testosterone can be applied either to the scrotal area or to other areas.

Injections

The following forms of injectable testosterone are available.

- ❑ Testosterone Cypionate 100 mg/ml
- ❑ Testosterone Propionate in Oil 100 mg/ml
- ❑ Testosterone Enanthanate 200 mg/ml

The usual dose is 1cc injected weekly or bi-weekly. This route of administration eliminates the risk of liver damage which may be caused by methyltestosterone as well as eliminating the theoretical risk of changes in cholesterol caused by oral medications. The

problem is fluctuating hormone levels and the discomfort of administration.

Subdermal Pellets

These pellets dissolve slowly over a period of approximately three to four months. This provides a normal and very stable serum testosterone level. This prescription causes less lowering of HDL cholesterol, as this does not pass through the liver.

The implant procedure consists of a small incision through which a trocar and cannula are inserted. The pellets are inserted through the cannula, and then the cannula is withdrawn. The incision is then closed with a Steri-Strip, and pressure is applied until bleeding stops, and the area is then covered with a dressing:

The requirement for the use of subdermal pellets include

- ❑ Good General Health
- ❑ No evidence for heart disease
- ❑ Normal Cholesterol levels
- ❑ Normal PSA levels
- ❑ Normal prostate examination, no history of prostate disease

Although administration of Testosterone to counter lack of it may seem to be the obvious solution, other treatment options are available. The alternatives to include the Testosterone precursors, androstenedione and androstenediol, which are available in oral capsules or sublingual sprays.

Side Effects of Testosterone Replacement Therapy

TRT can have undesirable side effects that include nausea, vomiting, jaundice, ankle swelling and frequent or persistent erections. Breast enlargement can also develop as Testosterone can be converted to estrogen via the enzyme aromatase. More serious complications include water retention, liver toxicity, cardiovascular disease, sleep apnea, and prostate enlargement. These risks are relatively uncommon when the dosage is closely monitored to that found physiologically in the body.

TRT is contraindicated in men with carcinoma of the breast or known or suspected carcinoma of the prostate. A digital rectal examination (DRE) and laboratory test for prostate specific antigen (PSA) should be checked before initiation of therapy and every 3 to 6 months thereafter.

TRT also should not be considered in those with known hypersensitivity to the preparation or in patients with compromised cardiac, renal, or hepatic functions.

While there is no direct evidence that link Testosterone replacement to accelerated prostate enlargement, there is a correlation between Testosterone treated hypogonadal men and normal men with prostate volume and age.

Results of TRT may not be evident for several weeks. Impotence may not be corrected after several months of therapy despite improvement in other Andropause symptoms. For these patients, evaluation for causes of erectile dysfunction other than hypogonadism due to Andropause is indicated.

Alternative approaches towards managing Andropause.

So far a detailed description of lack of Testosterone causing Andropause and the replacement of Testosterone as treatment has been given, with a simple formula that there is a deficiency of Testosterone that needs replacement. This is not as simple as it seems. In **Chapter IV** it has been mentioned that Testosterone though secreted by testes is maintained through a complex system of different organs and the hormones secreted by them. Therefore TRT should not only imply simple Testosterone replacement but should be considered as a comprehensive hormonal replacement regimen. In men, the following hormones need special attention *vis a vis* Andropause:⁵

1. *Human Growth Hormone*

The replenishment of growth hormone from a deficient state can lead to an improved sex life; skin tone and can help to balance other hormones in the body including Testosterone, DHEA, melatonin, pregnenolone, and progesterone.

The quick way to reverse the declining human Growth Hormone (hGH) level is by hGH injections. **A physician must monitor the injections.** As with all hormones, growth hormone can be fatal if administered without proper precautions.

The common complications can be preventing by hGH replacement through oral route. Instead of giving hGH in injectable form, the precursors that stimulate the production of hGH are known as **secretagogues**. Secretagogues are natural elements and side effects are rare. The results, though not as significant as injections, have been very encouraging. This is a recent development in preventing ageing. Since the hGH replacement is only a collection of different food components namely amino acids, minerals and vitamins, the authenticity of hGH replacement therapy is not yet establishment. The secretagogues are not yet available in India but these are being used extensively in USA but it is not approved by Federal Drug Administration (FDA) an authority that controls the quality and production of drugs in USA. Firms like Cenegenics ⁶advocate the following essential elements:

Calcium (elemental) 1000mg, Magnesium Glycinate 400 mg, Manganese 12 mg, Boron 2 mg, Silica 100 mg, Vit D₃ 400IU, Vit K 150 microgram and Copper 2 mg.

In addition to these elements there are certain other Amino Acids that are added to the prescription by some

other firms. Those interested in these formulations may contact the relevant agencies in USA or may contact the author.

Other ways to increase growth hormone release endogenously include intense strength training, cardiovascular exercises, calorie restrictions, and proper intake of nutraceutical supplementation, vitamins, antioxidants and amino acids such as glutamine, ornithine, and lysine that acts as a pro-hormones.

2. *DHEA*

Many people have reported more energy, ability to handle stress more easily, think more clearly and generally feel better, after receiving DHEA. Other benefits include enhanced immunity (stronger resistance to colds, flu etc) and lower cholesterol levels.

DHEA's ability to rejuvenate the immune function is particularly worthy of consideration. It boosts antibody production; enhances the activity of monocytes and maximizes the anti-cancer function of immune cells known as T lymphocytes.

One interesting note is that DHEA is not regulated by a negative feedback loop in the body. In other words, taking supplements of DHEA will not suppress the production of these hormones or cause the adrenal to rest and result in atrophy from the disuse.

DHEA replacement therapy offers powerful health benefits and is virtually risk-free. The usual starting dose is 25 mg. Men may require a higher quantity (up to 100 mg) while women may need less (up to 50 mg).

3. *Pregnenolone*

Numerous studies have shown the effects of pregnenolone on the body and brain. It boosts energy,

elevates mood and improves memory and mental performance. Pregnenolone also creates a sense of well being while improving the ability to tolerate stress. Furthermore, pregnenolone has a host of advantages which includes the ability to influence cerebral function, energy level, the female reproductive cycle, immune defenses, inflammation, mood, skin health, sleep patterns, stress tolerance, wound healing. Taking pregnenolone therefore normalizes and rejuvenates the entire adrenal cascade.

The normal starting dose is 15 mg, increasing up to 100 mg for men or women. There are minimal side effects.

Although pregnenolone has not been studied as extensively as DHEA as it is a precursor of DHEA and since it appears to decline as rapidly as DHEA, pregnenolone should also be considered in a comprehensive hormonal replacement regimen.

It is often recommended for anti-aging purposes that both pregnenolone and DHEA be taken together. Since some pregnenolone is converted into DHEA, the amount of DHEA intake can be lowered if both are taken together.

4. Melatonin

One of the causes of the disruptions of sleeping patterns during aging is the reduction in the nightly release of melatonin by the pineal gland. Many people have discovered that bedtime doses of melatonin restored their ability to obtain a sound and peaceful night's sleep. Melatonin levels are known to decline drastically with age. (lower) gonadotropin levels.

The exact dosage varies greatly between people. Trial and error is the best method. A higher dose does not mean more potency. Some people may feel better with a smaller dose. To normalize sleep and the bio-clock, a good

dosage to start is 1 mg and should be gradually increased if there are no side effects.

5. *Normalization of Hypothalamic Function*

The following substances are postulated to restore the hypothalamic (central) or peripheral (end organ) receptor sensitivity to Testosterone. They are not commonly used as an anti-aging therapeutic modality due to the lack of long-term clinical studies into its effectiveness.

- ❑ *Metformin*: Metformin is an oral anti-diabetic prescription drug. It is also a very effective anti-aging agent. Metformin acts by re-sensitizing the hypothalamus to negative feedback inhibition by steroid hormones. Metformin may also increase Testosterone levels by normalizing blood glucose and insulin levels.
- ❑ *Goat's Rue (Galega officinalis)*: Goat's Rue is the herbal prototype of the biguanide class of pharmaceuticals that includes metformin. It is believed that Goat's Rue would have the same effects as Metformin although there is a lack of sufficient research to substantiate the claims.
- ❑ *Puncture vine (Tribulus terrestris)*: Tribulus is an herb that has been used for centuries in India as a treatment for both male and female sexual dysfunction. Tribulus has also been used to increase libido and sexual performance in experimental animals and men.

Tribulus also seems to stimulate the central nervous system directly to increase the secretion of LH thus resulting in an increased level of Testosterone. It is also postulated that tribulus may directly sensitize the Leydig cells of the testes. These cells in turn produce Testosterone in response to LH.

6. *Nutritional Supports*

Andropause is a syndrome of degenerative disease characterized by age related diseases such as cardiovascular dysfunction, cancer and arthritis. One of the primary mechanism of Andropause may be oxidative stress from free radicals. Through improper diet, external pollutants, stress of life, our body's cells are continually bombarded by millions of free radicals each day. The degree and the amount of free radicals present in the body are related directly to the speed of the aging process.

Therefore, one of the primary goals of preventing Andropause may be retarding the proliferation of free radicals through intake of food rich in anti-oxidants and antioxidants supplements.

While there is no established laboratory reference for the ideal intake level of antioxidants for anti-aging, many in the forefront of anti-Andropause research are advocating much higher levels of intake than the Recommended Dietary Allowance (RDA).

7. *Proper Exercise*

Exercise, in addition to its cardiovascular benefits, also increases the level of hormones in the body, which include growth hormone, Testosterone, DHEA and pregnenolone. Performing strength-training exercise is a key component because of the above-mentioned effects.

Following an anti-aging exercise program incorporating flexibility training, cardiovascular training, and strength training program in a balanced fashion is the key to preventing Andropause. It is strongly advised that none of the three components should be ignored. The author may be contacted for further information regarding the types of exercises.

8. *Alternative Therapies in Indian System of Medicine (Ayurveda)*

There are several authors and authorities who advocate some or the other form of treatments for

Andropause and the related Erectile Deficiency. The matter submitted in this section has been referred to from the works of Mr. HK Bakhru⁷, Indian Council of Medical Research⁸, National Institute of Science Communication⁹, and Mr. Nadkarni AK¹⁰.

Many herbs, animal and mineral substances are used as aphrodisiac. It is advised to take these types of substances regularly to maintain the good health especially in later age.

a) *Asparagus adscendens*:

Tubers and/or powder of tubers with milk and sugar improves seminal weakness and impotence.

b) *Asparagus recemosus* (Ghrita):

Ghrita prepared by fresh root juice with milk, honey, sugar and long-pepper is excellent rejuvenator, improves general as well as sexual health.

c) *Crocus Sativus* (Saffron):

The essential oil of saffron shows a stimulatory effect on central nervous system and act as aphrodisiac.

d) *Allium Cepa* (Onion):

It also has stimulating effectr thus increases sexual desire and strengthens the complete reproductive system. Generally juice of bulb & money or paste of bulb fried with butter is recommended for this purpose.

e) *Allium Sativum* (Garlic):

This common culinary substance may also be used as an aphrodisiac especially in debility caused by ageing or overindulgence in sex.

f) *Zingiber officinale* (Ginger):

Ginger juice with honey and a half boiled egg at retiring time for atleast a month is recommended for toning up the sexual system.

g) *Hyqsophilla spinosa*:

Seeds of this plant are used as aphrodisiac either alone with milk and sugar or with wine or may be combined with tribulus terrestris and asparagus adseeners with milk and sugar for sexual sufficiency.

h) *Mucuna Pruriens* (Cowhage):

Seeds of this plant are once of the best nervine tonic and aphrodisiac. It can be used alone or with many similar action performing drugs i.e. tribulus, hygrophylla, asparagus etc.

i) *Myristicis fragrans* (Nutmeg):

Nutmeg or mace can be used as sexual tonic especially in premature ejaculation.

j) *Orchis latifolia* (Salep orchid):

It is also an excellent aphrodisiac advised in sexual and general weakness or all types of wasting conditions. Its tuberous roots power alone or combination with other plants is used for the same purpose.

k) *Trachyspermum ammi* (Omum):

Omum seeds and seed's power of tamarind with ghee help in restoration of vitality and removes premature ejaculation.

l) *Emblica officinalis* (Indian Gooseberry):

It is one of the richest sources of vitamin C. From the time immortal, it is used as revitalizer, tonic and as immunity modulator. Juice of fresh fruits or powder of dried fruits can be used with honey or ghee. It also acts as mild laxative & fertility promoter.

m) *Saussurea lappa* (kuth) (Eng – Castus):

This small herb is also stimulant, aphrodisiac and tonic. Root powder with honey is recommended for this purpose.

n) *Withania Somniferum* (Winter cherry):

Winter cherry (Ashwagandha) is a well-known stress reliever, aphrodisiac, nervine tonic and revitalizer. It is

known as “Indian Ginseng”. It’s root power with milk or honey or ghee is very effective.

o) *Tribulus Terrestris* (Small Caltrops):

The complete plant or fruits are used as decoction or infusion for strengthening the urogenital system.

CHAPTER XVI

END NOTE

Ever since I became aware of Andropause, I have been on the look out for similar cases. This was much before the notion of writing this book was conceptualized. My search, over the last few months, has resulted in collection of more than a dozen of cases with varying clinical presentation. In all of these, simple total testosterone level was assayed through simple laboratory tests. Obviously all but two patients had testosterone levels below the normal values. The two cases that did not have below normal levels, however, had levels along the lower borderline of normal values. I think it is significant clinical observation and we should appreciate that with males it is more important to diagnose a case of Andropause on the basis of clinical presentation. The variety of presentations make it difficult to create a clinical typeset for Andropause and it is usual for physicians to get patients who have symptomatology that is different from what they have learnt and practiced. The following examples authenticate this statement:

1. A 56 years old male came to my clinic with severe backache that was not responding to usual treatment. It had persisted for nearly 1-1/2 years. There were no clinical observations and findings that could suggest involvement of muscles in the lower limbs. The patient also had hypertension and was in severe depression. He was put on oral testosterone and within a period of one week, the backache vanished. His mental frame improved. Oral testosterone were discontinued after one

month. At present the patient is pain-free since the last three months but is continuing with the treatment of hypertension. There were three other similar cases of backache and all of them have also improved with oral testosterone supplemented by physiotherapy.

2. An 80 years old male having collapse of first lumbar vertebra due to osteoporosis had severe pain in thighs and buttock region. He was apprehensive of standing even after six weeks of the fracture and management. The oral testosterone did the magic. Within one week of oral treatment of testosterone, he was on his feet without any pain.

3. Another patient of trochanteric fracture was up after unusually quick recovery in ten weeks after conservative management.

4. Another patient of 68 years old had osteoporosis of both knees and joints. On examination, he had some discomfort in both the tibiae and the femora. Within two weeks after starting oral testosterone, he had about 25% improvement in his knees and with this he was found cheerful and as usual started his long morning walks that he had discontinued earlier.

5. Dr. Manvir Gupta from Punjab had been kind enough to provide the clinical history of hypertension cases alongwith with diabetes mellitus. One such patient according to Dr. Gupta presented as an emergency with low serum potassium. The patient happened to be from USA. After starting treatment with oral testosterone, he improved in his general clinical conditions marvelously. Of course with this treatment, hypertension alongwith the testosterone had great results.

6. Another patient of Dr. Manvir Gupta presented wall myocardial infraction because of low testosterone. With oral testosterone and other medicines, the patient is improving fast.

Above are only some of the examples of Andropause that may be present in some abnormal forms with the patients not

complaining of the usual signs and symptoms of the disease. Andropause is rather a syndrome and it may have more effect on some organs of the body or the other organs. The physicians must keep Andropause in his mind when he is at a loss to reach an important diagnosis in males. One simple test of testosterone assayed may give the reply to the clinical situation.

Do I Have Andropause?

Andropause is a hormone-related condition of low-testosterone. It usually occurs in males aged 40 and onwards. Take this test and find out if you have the symptoms of andropause. To complete the quiz, simply check-in the boxes that relate to you.

Please answer all the questions before viewing your results

- | | |
|---|--------------------------|
| 1. Have you noticed weakness of muscles? | <input type="checkbox"/> |
| 2. Do you have wasting of muscles? | <input type="checkbox"/> |
| 3. Do you feel less energetic than usual? | <input type="checkbox"/> |
| 4. Do you think your muscles are getting flabby? | <input type="checkbox"/> |
| 5. Do you forget things that you otherwise wouldn't have? | <input type="checkbox"/> |
| 6. Is there lack of interest in work? | <input type="checkbox"/> |
| 7. Do you feel depressed than usual? | <input type="checkbox"/> |
| 8. Do you have mood swings? | <input type="checkbox"/> |
| 9. Are you falling asleep after dinner? | <input type="checkbox"/> |
| 10. Do you have a decrease in your sex drive (libido)? | <input type="checkbox"/> |
| 11. Are your erections strong? | <input type="checkbox"/> |
| 12. Do you think that your posture is deteriorating? | <input type="checkbox"/> |

How do you fare?

If you have checked upto 3 boxes: Maybe positive

If you have checked 3 - 6 boxes: Likely positive

If you have checked > 6 boxes: Strongly positive

Every person is different. And not all men going through this stage of life will experience it exactly the same way. The passage into middle age is a complicated phase. It's full of changes at all levels - personal, social, economic, family, etc. It may therefore be difficult to differentiate your changes from the symptoms of other conditions, unrelated to andropause.

*Nevertheless, you did answer, "YES" to Questions 3, 6 and 10, or to **any other four questions**. Therefore it would be worthwhile to discuss these symptoms with your physician. He or she may have your 'bioavailable' testosterone level checked through a simple blood test.*



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Prof. V.P. Bansal is a graduate from the pioneer batch of 100 papers in national and international journals and presented more Government Medical College, Rohtak. He is one of the very few orthopaedic surgeons in India with M.Ch. (Ortho.) qualifications and that too from the internationally renowned University of Liverpool. He is a Fellow of British Orthopaedic Association, Indian Orthopaedic Association and North Zone Orthopaedic Association besides many other national and international scientific societies and academic bodies. Recipient of numerous medals and honours, his career of almost 50 years is an example of outstanding clinical, research and administrative skills. He has authored over than 200 papers at national and international conferences.

Prof. Bansal is a thoroughly acclaimed Orthopaedic surgeon with distinction of being the youngest Professor at Post Graduate Institute of Medical Education & Research, Chandigarh. He also held the coveted position as Director, Central Institute of Orthopaedics, New Delhi; Medical Superintendent, LNJP Hospital, New Delhi; Director, All India Institute of Physical Medicine and Rehabilitation, Mumbai; and Additional Director General of Health Services, Government of India, Ministry of Health and Family Welfare. As Additional Director General of Health Services, he framed policies to upgrade medical and para-medical education.

Prof. Bansal has his own innovative methods for providing health to the aged, fulfilling the theme for the year 2012 declared by WHO for providing good health to the aged and adding life to years. Prof. Bansal is working on this theme for the last 9 years, investigating the aged to find out the possible cause for ageing. He is working on the theme "It's not the age which leads to decline of hormones; it is rather the decline of hormones which leads to ageing." With his philosophy, he has provided good health to nearly 700 aged men and women so far and this work still continues.

Keeping in view the same theme, Prof. Bansal has established an association named Indian Association of Age Management in 2009. He is the chairman of this association.

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